

# Technical Sessions

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## **[TS01] Nanotechnology for Energy Harvesting**

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### **Theme: Energy Harvesting Material and Device Technologies**

Energy harvesting concerns the conversion of unused or wasted energy (mechanical force, water, air, light) in an ambient environment into useful electrical energy. It plays a pivotal role by enabling autonomous and sustainable IoT devices, ensuring their efficient operation without the constant need for battery replacements. This technology extends its influence to wearable sensors, enhancing their functionality and lifespan, particularly in the field of biomedical applications where energy-efficient, long-lasting sensors are essential for patient monitoring and healthcare advancements. Furthermore, contributing to the achievement of carbon neutrality can be facilitated through rapid transitions to cleaner and more sustainable energy sources, including innovations in green energy harvesting technologies such as hydrogen production and carbon dioxide reduction technologies.

# [TS01W1]

## Nanotechnology for Energy Harvesting 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 205
Session Chair(s)	Jeong Min Baik (Sungkyunkwan Univ.)

### TS01W1\_I\_1 \*Invited 09:00–09:30

#### Syngas Economy with Green Hydrogen for Rapid Decarbonization of Fuels and Chemicals

Seok-jin Kim<sup>1</sup>, Youngdong Song<sup>2</sup>, Javeed Mahmood<sup>1</sup>, and Cafer T. Yavuz<sup>1</sup>

(<sup>1</sup>KAUST, <sup>2</sup>Max Planck Institute for Coal Research)

### TS01W1\_O\_2 09:30–09:45

#### Highly Efficient Single Atom Catalyst for Electrochemical CO<sub>2</sub> Reduction to Ethanol via Maximizing Atomically Dispersed Copper Sites

Sung Yeol Choi, Chae Heon Woo, Jiho Jeon, Jae Young Choi, and Jeong Min Baik

(Sungkyunkwan University)

### TS01W1\_O\_3 09:45–10:00

#### Maximizing Efficiency at the Three-Phase Interface in Electrolyzers

Phil Woong Kang, Seokjin Kim, Javeed Mahmood, Anas Bintin, Sarah Aqeel, Hamad Saiari, Issam Gereige, and Cafer T. Yavuz

(KAUST)

### TS01W1\_O\_4 10:00–10:15

#### Empowering CO<sub>2</sub> Reduction: Optimizing TENG Impedance for Enhanced Power Supply

Do-Heon Kim, Jin-Kyeom Kim, and Jeong Min Baik

(Sungkyunkwan University)

### TS01W1\_O\_5 10:15–10:30

#### Scalable Fabric Electrode for Electrochemical Catalytic Reaction

Seok-Jin Kim<sup>1,2</sup>, Ga-Hyeun Lee<sup>1</sup>, Jung-Eun Lee<sup>1</sup>, Javeed Mahmood<sup>2</sup>, Gao-Feng Han<sup>3</sup>, Inkyung Baik<sup>1</sup>, Changbeom Jeon<sup>1</sup>, Minjung Han<sup>1</sup>, Hwakyung Jeong<sup>1</sup>, Cafer T. Yavuz<sup>2</sup>, Han Gi Chae<sup>1</sup>, and Jong-Beom Baik<sup>1</sup>

(<sup>1</sup>UNIST, <sup>2</sup>KAUST, <sup>3</sup>Jilin University)

**[TS01W2]****Nanotechnology for Energy Harvesting 2**

<b>Date &amp; Time</b>	July 3(Wed.), 2024 / 15:40–17:40
<b>Place</b>	Room 205
<b>Session Chair(s)</b>	Jun Chen (UCLA)

<b>TS01W2_I_1    *Invited</b>	<b>15:40–16:10</b>
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**Piezoelectric DC Generator through Sequential In-phase Polarization Variation**Hyun-Cheol Song<sup>1,2</sup>*(<sup>1</sup>KIST, <sup>2</sup>Sungkyunkwan University)*

<b>TS01W2_O_2</b>	<b>16:10–16:25</b>
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**Morphotropic Phase Boundary Formation of PbZrO<sub>3</sub>–PbTiO<sub>3</sub> Composite Film by Aerosol Deposition**Hyunseok Song<sup>1</sup>, Nayeon Kang<sup>1</sup>, Minjung Kim<sup>1</sup>, Taek-Kyeong Seong<sup>1</sup>, Dae-Yong Jeong<sup>2</sup>, and Jungho Ryu<sup>1</sup>*(<sup>1</sup>Yeungnam University, <sup>2</sup>Inha University)*

<b>TS01W2_O_3</b>	<b>16:25–16:40</b>
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**High-Performance Flexible Piezoelectric Single Crystal-Based 0–3 Composites for Energy Harvesting Applications**Hyunhee Kwon<sup>1</sup>, Yongjun Choi<sup>1</sup>, Hoyong Lee<sup>2</sup>, and Miso Kim<sup>1</sup>*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Ceracomp Co., Ltd.)*

<b>TS01W2_O_4</b>	<b>16:40–16:55</b>
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**Ultrasound-Responsive Piezoelectric-Assisted Aligned Structured Scaffold for Promoting Nerve Regeneration**Dabin Kim<sup>1</sup>, Sera Jeon<sup>2</sup>, Miso Kim<sup>1</sup>, and Sang-Woo Kim<sup>2</sup>*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Yonsei University)*

<b>TS01W2_O_5</b>	<b>16:55–17:10</b>
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**Aurivillius-Type Strontium Bismuth Titanate Composite Film-Based Flexible Triboelectric Nanogenerators for Versatile Applications**Anand Kurakula<sup>1</sup>, Mandar Vasant Paranjape<sup>1</sup>, Punnarao Manchi<sup>1</sup>, Shaik Junied Arbaz<sup>1</sup>, Lohit Kumar Srinivas Gujjala<sup>2</sup>, Sontyana Adonijah Graham<sup>1</sup>, Venkata Siva Kavarthapu<sup>1</sup>, and Jae Su Yu<sup>1</sup>*(<sup>1</sup>Kyung Hee University, <sup>2</sup>National Institute of Technology Rourkela)*

TS01W2\_O\_6

17:10-17:25

**Electrospun Cobalt Ferrite Nanoparticles Embedded into Triboelectric Polymer for Mechanical Energy Harvesting**

Venkata Siva Kavarthapu, Mandar Vasant Paranjape, Punnarao Manchi, Anand Kurakula, Sontyana Adonijah Graham, and Jae Su Yu

*(Kyung Hee University)*

TS01W2\_O\_7

17:25-17:40

**Efficient Thermal Management Strategy via Oriented Heat Transfer by Passive Cooling Material**

Da Seul Kim and Jeong Min Baik

*(Sungkyunkwan University)*

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# [TS01T3]

## Nanotechnology for Energy Harvesting 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 205
Session Chair(s)	Hyun-Cheol Song (KIST)

TS01T3_I_1	<b>*Invited</b>	09:00–09:30
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**Smart Textiles for Personalized Health Care**

Jun Chen

*(University of California)*

TS01T3_O_2	09:30–09:45
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**Triboresistive Touch Sensing: Grid-Free Touch Point Recognition based on Ionic Power Generators**

Younghoon Lee

*(Gachon University)*

TS01T3_O_3	09:45–10:00
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**Triboelectric Effect-Based Array-Free Touch Position Sensor with Sedimentation-Driven Development of Bifunctional Carbon Nanocomposite**

Yoonsang Ra, Jiho Bang, Dongik Kam, Donghan Lee, Sumin Cho, Sunmin Jang, Gyunam Park, Jin-Gyun Kim, and Dongwhi Choi

*(Kyung Hee University)*

TS01T3_O_4	10:00–10:15
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**Self-Powered Acceleration Sensor for Distance Prediction via Triboelectrifications**

Zhengbing Ding and Dukhyun Choi

*(Sungkyunkwan University)*

TS01T3_O_5	10:15–10:30
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**Energy Autonomous Environment Monitoring System Powered by Wind Energy**

Vishwanathan Ravichandran, Swapnil Shital Nardekar, Jyoti Prakash Das, and Sang-Jae Kim

*(Jeju National University)*

## [TS01T4]

### Nanotechnology for Energy Harvesting 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 205
Session Chair(s)	Hyesung Park (Korea Univ.)

**TS01T4\_I\_1    \*Invited** 14:00–14:30

**Composite Solid Electrolytes of Synergistic Integration with Energy Harvesting Device**

Jae Hyun Kim

*(DGIST)*

**TS01T4\_O\_2** 14:30–14:45

**Development of Bimetallic Ag–MOF with Reduced Bandgap for High-Performance Asymmetric Supercapacitors**

Muhammad Ramzan Khawar, Muhammad Awais, and Dongwhi Choi

*(Kyung Hee University)*

**TS01T4\_I\_3    \*Invited** 14:45–15:15

**Optimization Guidelines and Strategies for Intrinsically Stretchable Organic Photovoltaics**

Long Ye

*(Tianjin University)*

**TS01T4\_O\_4** 15:15–15:30

**Modulating Solution Aggregation and Molecular Order for Efficient and Thermally Stable Polymer Solar Cells**

Kai Zhang and Long Ye

*(Tianjin University)*

**[TS01T5]****Nanotechnology for Energy Harvesting 5**

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 15:40–17:40
<b>Place</b>	Room 205
<b>Session Chair(s)</b>	Cafer T. Yavuz (KAUST)

**TS01T5\_I\_1 \*Invited 15:40–16:10****Doping and Interface Engineering of Electrocatalysts for Efficient Water Splitting**

Daekyu Kim, Zhen Li, and Lawrence Yoon Suk Lee

*(The Hong Kong Polytechnic University)***TS01T5\_I\_2 \*Invited 16:10–16:40****Phase Engineering in Transition Metal Dichalcogenides toward Efficient Electrocatalysis**

Hyesung Park

*(Korea University)***TS01T5\_O\_3 16:40–16:55****Boosted Electron Transfer Induced by N-Doped Graphene Quantum Dots in LaSrCoO/FeOOH for Efficient Bifunctional Electrocatalyst**

Sang Heon Kim and Jeong Min Baik

*(Sungkyunkwan University)***TS01T5\_O\_4 16:55–17:10****Floatable Photocatalytic Hydrogel Nanocomposites for Large-Scale Solar Hydrogen Production**Wang Hee Lee<sup>1,2</sup> and Dae-Hyeong Kim<sup>1,2</sup>*(<sup>1</sup>IBS, <sup>2</sup>Seoul National University)***TS01T5\_O\_5 17:10–17:25****A Robust and Highly Active Bimetallic Phosphide/Oxide Heterostructure Electrocatalyst for Efficient Industrial-Scale Hydrogen Production**Balakrishnan Kirubasankar<sup>1</sup>, Jisu Kwon<sup>2</sup>, Sohyeon Hong<sup>2</sup>, Soo Min Kim<sup>2</sup>, and Ki Kang Kim<sup>1</sup>*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Sookmyung Women's University)***TS01T5\_O\_6 17:25–17:40****Modulating the Electronic Structure of Exfoliated Layered Double Hydroxide by Lanthanide for Chlorine-Ion Blocking in Seawater Splitting**

Ashish Gaur and HyukSu Han

*(Sungkyunkwan University)*

[TS01F6]

Nanotechnology for Energy Harvesting 6

Date & Time	July 5(Fri.), 2024 / 09:00–10:30
Place	Room 205
Session Chair(s)	Kyungwho Choi (Sungkyunkwan Univ.)

TS01F6\_O\_1 09:00–09:15

**Advanced Heat Utilization System by Thermoelectric Generator via Ferroelectric Effect**  
Ji Young Park, Sun-Woo Kim, and Jeong Min Baik  
(*Sungkyunkwan University*)

TS01F6\_O\_2 09:15–09:30

**Developing a Synergetic Hybrid Thermoelectric–Piezoelectric Generator to Enhance Heat Dissipation using Cantilever Vibration**  
SeungBum Kim, Hyun-Cheol Song, and Sunghoon Hur  
(*KIST*)

TS01F6\_O\_3 09:30–09:45

**Synthesis of Amorphous Pd-Based Nanostructures for Efficient Catalytic Reactions**  
Qinxin Luo<sup>1</sup>, Yiyao Ge<sup>2</sup>, and Hua Zhang<sup>1</sup>  
(<sup>1</sup>*City University of Hong Kong*, <sup>2</sup>*University of Science and Technology Beijing*)

TS01F6\_O\_4 09:45–10:00

**Triboelectric–Electromagnetic Hybrid Energy Harvester for Operation of Various Functional Light-Emitting Diodes with a Wide Range of Application**  
Yu-Seop Kim<sup>1</sup>, Yoonsang Ra<sup>1</sup>, Chungyeon Cho<sup>2</sup>, Sangmin Lee<sup>3</sup>, and Dongwhi Choi<sup>1</sup>  
(<sup>1</sup>*Kyung Hee University*, <sup>2</sup>*Wonkwang University*, <sup>3</sup>*Chung-Ang University*)

TS01F6\_O\_5 10:00–10:15

**Multilayered Self-Powered Hybrid System for Sensors Applications**  
Monunith Anithkumar and Sang-Jae Kim  
(*Jeju National University*)

TS01F6\_O\_6 10:15–10:30

**Intrinsically Flexible All-Inorganic Nanoribbon Yarn for Energy Applications**  
Hanhwi Jang<sup>1</sup>, Junseong Ahn<sup>2</sup>, Yongrok Jeong<sup>3</sup>, Ji-Hwan Ha<sup>1</sup>, Jun-Ho Jeong<sup>4</sup>, Min-Wook Oh<sup>5</sup>, Inkyu Park<sup>1</sup>, and Yeon Sik Jung<sup>1</sup>  
(<sup>1</sup>*KAIST*, <sup>2</sup>*Korea University*, <sup>3</sup>*KAERI*, <sup>4</sup>*KIMM*, <sup>5</sup>*Hanbat National University*)

**[TS01F7]****Nanotechnology for Energy Harvesting 7**

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 14:00-16:15
<b>Place</b>	Room 205
<b>Session Chair(s)</b>	Jae Won Lee (Kangwon Nat'l Univ.)

**TS01F7\_O\_1 14:00-14:15****Fully Self-Powered Wind Speed Indicator based on Complementary Integration of Triboelectric-Optical Responsive System**

Sumin Cho, Jun-Sung Park, Soban Ali Shah, Tae-Woong Moon, Sunmin Jang, Donghan Lee, Suk-Won Choi, and Dongwhi Choi  
(*Kyung Hee University*)

**TS01F7\_O\_2 14:15-14:30****Self-Adaptive Bidirectional Direct-Current Triboelectric Nanogenerator based on Mechanical Switching for Harvesting Reciprocating Motions**

Donghan Lee, Joon Min Chae, Sumin Cho, and Dongwhi Choi  
(*Kyung Hee University*)

**TS01F7\_O\_3 14:30-14:45****Novel Approaches toward the Highly Functional Droplet-Based Electricity Generator for Seamless Integration to Broad Applications**

Sunmin Jang<sup>1</sup>, Soban Ali Shah<sup>1</sup>, Sangeun Lee<sup>1</sup>, Sumin Cho<sup>1</sup>, Dongik Kam<sup>1</sup>, Yoonsang Ra<sup>1</sup>, Donghan Lee<sup>1</sup>, Muhammad Ramzan Khawar<sup>1</sup>, Donghyeon Yoo<sup>2</sup>, Younghoon Lee<sup>3</sup>, and Dongwhi Choi<sup>1</sup>  
(<sup>1</sup>*Kyung Hee University*, <sup>2</sup>*University of Illinois Urbana-Champaign*, <sup>3</sup>*Gachon University*)

**TS01F7\_O\_4 14:45-15:00****Moisture-Driven Energy Generation by Vertically Structured Polymer Aerogel on Water-Collecting Gel**

Kaiying Zhao, Shengyou Li, and Cheolmin Park  
(*Yonsei University*)

**TS01F7\_O\_5 15:00-15:15****Computational Analysis of Starch for Sustainable Power Generation towards Integrated Wearable IoT**

Thanjan Shaji Bincy and Sang-Jae Kim  
(*Jeju National University*)

**TS01F7\_O\_6 15:15-15:30****Augmented Neuromuscular Transmission: Bridging Physical and Cognitive Practices through Intrinsic Hybrid Nanogenerator-Integrated Conformation Analysis System**

Asokan Poorani Sathya Prasanna and Sang-Jae Kim  
(*Jeju National University*)

TS01F7\_O\_7

15:30–15:45

**Polydopamine-Treated Ag/TiO<sub>2</sub> Nanostructures Embedded Nylon Fibers-Based Triboelectric Nanogenerators for Mechanical Energy Harvesting**

Punnarao Manchi, Mandar Vasanth Paranjape, Sontyana Adonijah Graham, Anand Kurakula, Ventaka Siva Kavarthapu, and Jae Su Yu

*(Kyung Hee University)*

TS01F7\_O\_8

15:45–16:00

**Segregation-Structured Sulfur-Rich Polymer/MXene Composites for Sustainable, Reuseable and High-Performance Triboelectric Nanogenerator**

Woongbi Cho<sup>1</sup>, Sungsu Kim<sup>1</sup>, Hyeonhoo Lee<sup>1</sup>, Nara Han<sup>2</sup>, Hyunki Ki<sup>2</sup>, Minbaek Lee<sup>2</sup>, TaeHee Han<sup>1</sup>, and Jeong Jae Wie<sup>1</sup>

*(<sup>1</sup>Hanyang University, <sup>2</sup>Inha University)*

TS01F7\_O\_9

16:00–16:15

**High Voltage S-TENG for Next-Generation Energy Autonomous IoTs and Self-Powered Actuation System**

Jyoti Prakash Das, Swapnil Shital Nardekar, Vishwanathan Ravichandran, and Sang-Jae Kim

*(Jeju National University)*

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# [TS01] Poster Session 1

## Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS01W\_BP\_1

#### Hierarchical Phonon Scattering from Nano to Macro Scale in Bismuth Telluride Bulk Composites and Cost-Effective Module Structure

Anil Kumar<sup>1</sup>, Saurabh Thoravat<sup>1</sup>, Pooja Rawat<sup>1</sup>, Hyungyu Jin<sup>2</sup>, and Jong Soo Rhyee<sup>1</sup>

(<sup>1</sup>Kyung Hee University, <sup>2</sup>POSTECH)

### TS01W\_BP\_2

#### First-Principles Study of Mitigating Interfacial Degradation in Semi-Transparent Perovskite Solar Cells

Wonze Jung<sup>1</sup>, Syed Dildar Haider Naqvi<sup>2</sup>, SeJin Ahn<sup>2</sup>, and Kanghoon Yim<sup>1</sup>

(<sup>1</sup>Chungnam National University, <sup>2</sup>KIER)

### TS01W\_BP\_3

#### Enhancing the Output Energy and Durability of Triboelectric Nanogenerator via Nanostructured Interface of Dielectric and Electrode with Hot Water Treatment

Seonghun Hwang<sup>1</sup>, Yoonsang Ra<sup>1</sup>, Donghyeon Yoo<sup>2</sup>, and Dongwhi Choi<sup>1</sup>

(<sup>1</sup>Kyung Hee University, <sup>2</sup>University of Illinois Urbana-Champaign)

### TS01W\_BP\_4

#### Finger Motion Recognition with Triboelectric Multimodal Sensor based on Kinematic Design for Human-Machine Interfaces

Sangbeom Nam, Sumin Cho, Donghan Lee, Sunmin Jang, and Dongwhi Choi

(Kyung Hee University)

### TS01W\_BP\_5

#### Self-Powered Temperature Monitoring System based on Polydiacetylene Embedded Polyvinylidene Fluoride Nanofibers

Hakjeong Kim, Jaewon Cho, Seongmin Na, Huang ChenYao, Kyungwho Choi, Miso Kim, and Dukhyun Choi

(Sungkyunkwan University)

### TS01W\_BP\_6

#### Analysis of Improved Shock Detection and Dielectric Heating Properties by Adding CNTs to Piezoelectric Paint

Jihun Lee<sup>1</sup>, Hyunjin Bae<sup>2</sup>, and Kyungwho Choi<sup>1,2</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Korea Aerospace University)

### TS01W\_BP\_7

#### **Development of a Battery Thermal Management System with Thermoelectric Module and Phase Change Material**

Sung Kyu Chung, Bui Minh Quang, and Kyungwho Choi

*(Sungkyunkwan University)*

### TS01W\_BP\_8

#### **Characterization of a Body-Attached Thermoelectric Generator based on Polyurethane Foam Coated with Carbon Nanotubes**

Insik Jo and Kyungwho Choi

*(Sungkyunkwan University)*

### TS01W\_BP\_9

#### **Recovered Graphene-Hydrogel Nanocomposites for Multi-Modal Recognition via Optimized Triboelectrification and Machine Learning**

Thien Trung Luu and Dukhyun Choi

*(Sungkyunkwan University)*

### TS01W\_BP\_10

#### **Pyramid-Shaped Ag/PDMS Nanocomposites for Triboelectric Nanogenerators**

Akhmetzhanov Nursalim<sup>1</sup>, Kang Dong Joo<sup>1</sup>, Kim Jong Man<sup>1</sup>, Shin Dong-Myeong<sup>2</sup>, and Hwang Yoon-Hwae<sup>1</sup>

*(<sup>1</sup>Pusan National University, <sup>2</sup>The University of Hong Kong)*

### TS01W\_BP\_11

#### **Investigating Charge Dynamics: Copper-N-Type Silicon Interface in Sliding Mode DC Triboelectric Nanogenerator**

Dimaral Aben<sup>1</sup>, Yerkezhan Amangeldinova<sup>1</sup>, Kassymzhomart Kunanbayev<sup>2</sup>, Dong-Myeong Shin<sup>3</sup>, and Yoon-Hwae Hwang<sup>1</sup>

*(<sup>1</sup>Pusan National University, <sup>2</sup>KAIST, <sup>3</sup>The University of Hong Kong)*

### TS01W\_BP\_12

#### **Enhanced Performance of NdFeB-PMMA Composites Based Triboelectric Nanogenerator using Magnetization**

Nhat Nam Hoang<sup>1</sup>, Gi Hyeon Han<sup>2</sup>, and Jae Won Lee<sup>1</sup>

*(<sup>1</sup>Kangwon National University, <sup>2</sup>Yonsei University)*

### TS01W\_BP\_13

#### **Eu/Y-Codoped TiO<sub>2</sub>-Based Thin Film for Power Enhancement and UV Protection of Dye-Sensitized Solar Cells**

Darya Goponenko, Kamila Zhumanova, and Timur Sh. Atabaev

*(Nazarbayev University)*



**TS01W\_BP\_14**

**TiO<sub>2</sub>-NaYF<sub>4</sub>:Yb,Er Upconverting Nanostructures for the Improved Solar Light Harnessing in Dye Sensitized Solar Cells (DSSCs) and Photoelectrochemical (PEC) Devices**

Kamila Zhumanova, Darya Goponenko, and Timur Atabaev

*(Nazarbayev University)*

**TS01W\_BP\_15**

**Magneto-Mechano-Triboelectric Nanogenerator for Stray Magnetic Field Energy Harvesting**

Tae Kyoung Yoon<sup>1,2</sup>, Hyun Soo Kim<sup>1</sup>, Hyun-Cheol Song<sup>1</sup>, and Jeong Min Baik<sup>2</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Sungkyunkwan University)*

**TS01W\_BP\_16**

**Non-Contact Rotating Triboelectric Nanogenerator for Self-Powered Safety Light**

Jong Gun Park and Jae Won Lee

*(Kangwon National University)*

**TS01W\_BP\_17**

**Enhancing Charge Retention in Non-Contact Triboelectric Nanogenerators using Electrospun Polyvinyl Alcohol (PVA)/Polystyrene Sulfonic Acid (PSSA) Nanofibers**

Yoo Song Lee and Jae Won Lee

*(Kangwon National University)*

**TS01W\_BP\_18**

**Chemically Transformed Cu<sub>2</sub>Se-PbSe Thermoelectric Kinked Nanowires**

Minseong Lee, Seungwon Moon, Huigeun Lee, Sumin Choi, Geonhaeng Lee, Junyeong Suh, Sungmin Go, Sung-Gu Kang, Hyeon-Jun Bae, Sangwoo Lee, and Yun-Mo Sung

*(Korea University)*

**TS01W\_BP\_19**

**High Durability Moisture Electric Generator with PSSA/PVA/CNC Film**

Yeong heum Moon, Yeong jun Moon, and Jae Won Lee

*(Kangwon National University)*

**TS01W\_BP\_21**

**Mechanically Guided Geometry Transformation-Based Three-Dimensional Structure to Assign Various Functionality to Sensor**

Dongik Kam, Dayeon Jang, Yu-seop Kim, Donghan Lee, Hyeoncheol Yang, and Dongwhi Choi

*(Kyung Hee University)*

## [TS01] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS01T\_BP\_1

#### Microbial Disinfection in Portable Water Bottles Powered by Walking-Induced Electrostatic Charges

Jinsong Kim<sup>1</sup>, Young-Jun Kim<sup>2</sup>, Zheng-Yang Huo<sup>3</sup>, and Sang-Woo Kim<sup>1</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>KRICT, <sup>3</sup>Renmin University of China)

### TS01T\_BP\_2

#### Engineered Thermoplastic Polyurethane with Tunable Tribopolarity and Biodegradability for Advanced Triboelectric Nanogenerator

Yugyung Jin, Hyeonseo Joo, and Ju-Hyuck Lee

(DGIST)

### TS01T\_BP\_3

#### Electrodynamic Screen-Based Dust Removal using Wind-Driven Triboelectric Nanogenerators for Solar Panels

Junyeong Yang, Minsu Heo, and Ju-Hyuck Lee

(DGIST)

### TS01T\_BP\_4

#### Enhancing Sensitivity of MWCNT/Ecoflex Composite Strain Sensors via Pre-Stretching and Circular Auxetic Metamaterials

Jaewon Cho, Dong Hwi Kim, Yong Jun Choi, and Miso Kim

(Sungkyunkwan University)

### TS01T\_BP\_5

#### Activating Hydrogen Evolution Reaction Activity of Layered Double Hydroxide-Based Catalysts with Atomically Dispersed Rhodium Sites in Acidic Environments

Youngeun Kim and Wooseok Yang

(Sungkyunkwan University)

### TS01T\_BP\_6

#### Geometric Optimization of Cu<sub>2</sub>Se-Based Thermoelectric Device for Maximizing Power Generating Performance

Jungsoo Lee, Seungjun Choo, and Jae Sung Son

(POSTECH)

TS01T\_BP\_7

**Ductile (Ag,Cu)<sub>2</sub>(S,Se,Te)-Based Auxetic Metamaterials for Efficient and Durable Thermoelectric Power Generation**

Seong Eun Yang<sup>1</sup>, Youngtaek Oh<sup>2</sup>, and Jae Sung Son<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>UNIST)

TS01T\_BP\_8

**Ultrasound-Driven, Capacitance-Optimized Triboelectric Implants for Neurostimulation**

Jinyoung Jeon<sup>1</sup>, Young-Jun Kim<sup>2</sup>, and Sang-Woo Kim<sup>1</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>KRICT)

TS01T\_BP\_9

**High-Performance and Super-Flexible Core-Shell Fiber Moisture Electric Generators Enabled by Biomimetic Dual Driving Forces**

Guangtao Zan and Cheolmin Park

(Yonsei University)

TS01T\_BP\_10

**Fabrication of Complex 3D Structured Ceramics based on Direct Ink Writing**

So-Min Song, Hyun-Cheol Song, and Sunghoon Hur

(KIST)

TS01T\_BP\_11

**Intelligent Sensor Applications using Conductive Carbon Nanotube Sponge-Integrated Triboelectric Nanogenerators**

Jaehee Shin, Doohyun Han, and Jinhyoung Park

(KOREATECH)

TS01T\_BP\_12

**Surface Reconstruction of Ni-Fe Layered Double Hydroxide Inducing Chloride Ion Blocking Materials for Outstanding Overall Seawater Splitting**

Enkhbayar Enkhtuvshin and HyukSu Han

(Sungkyunkwan University)

TS01T\_BP\_13

**Biological Mechano-Electric Coupling Properties based on  $\beta$ -Chitin Nanofibrils of Deep-Sea Tubeworms**

Hyunseung Kim<sup>1</sup>, Gyoung-Ja Lee<sup>2</sup>, Yu Ogawa<sup>3</sup>, Yebin Lee<sup>1</sup>, Min-Ku Lee<sup>2</sup>, Changyeon Baek<sup>2</sup>, and Chang Kyu Jeong<sup>1</sup>

(<sup>1</sup>Jeonbuk National University, <sup>2</sup>KAERI, <sup>3</sup>Université Grenoble Alpes)

**TS01T\_BP\_15**

**Beyond Traditional Droplet-Based Electricity Generators: Exploring the Potential of Energy Harvesting with Droplet Squeezing Motion on Stenocara-Inspired Surface with Heterogeneous Wettability**

Soban Ali Shah, Sunmin Jang, Sumin Cho, and Dongwhi Choi

*(Kyung Hee University)*

**TS01T\_BP\_16**

**Sound-Based Triboelectric Platform Fabricated by using Mechanically 4D Printing Technology**

Girak Gwon, Dongik Kam, Yoonsang Ra, Donghan Lee, and Dongwhi Choi

*(Kyung Hee University)*

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## [TS01] Poster Session 2

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30-12:00
<b>Place</b>	Exhibition Hall 4,5

### TS01T\_P\_1

#### Electronic Structure of Polytetrafluoroethylene with Surface States and its Role on Contact Electrification

Yong Hyun Kwon, Seong Min Kim, and Sang-Woo Kim  
(Yonsei University)

### TS01T\_P\_2

#### Injectable and Fully Biodegradable Triboelectric Nanogenerator Powered by Ultrasound

Yong Hyun Kwon, Xiao Xiao, and Sang-Woo Kim  
(Yonsei University)

### TS01T\_P\_3

#### Eu and Mn Co-Doped High Tc PIN PMN PT Piezoelectric Ceramics for High Power Application

Min Woo Kim<sup>1,2</sup>, Dong-Gyu Lee<sup>1,2</sup>, Chong-Yun Kang<sup>1</sup>, Sahn Nahm<sup>2</sup>, and Hyun-Cheol Song<sup>1,3</sup>  
(<sup>1</sup>KIST, <sup>2</sup>Korea University, <sup>3</sup>Sungkyunkwan University)

### TS01T\_P\_4

#### Selective Wavelength Multi-Stacked Layer Absorber for Solar Desalination

Ga Eun Lee and Jeong Min Baik  
(Sungkyunkwan University)

### TS01T\_P\_5

#### Recent Advances in Functional Fiber-Based Wearable Triboelectric Nanogenerators

Seongmin Na and Dukhyun Choi  
(Sungkyunkwan University)

### TS01T\_P\_6

#### Extraction of Heavy Metals from Contaminated Soil using Electrokinetic Process and Different Chelating Agents

Muhammad Awais, Muhammad Ramzan Khawar, and Dongwhi Choi  
(Kyung Hee University)

## [TS01] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS01F\_P\_1

#### Direct Current-Generating Tribovoltaic Nanogenerators based on Dynamic p–n Junction with Defect Passivation

Sera Jeon<sup>1</sup>, Dabin Kim<sup>2</sup>, and Sang-Woo Kim<sup>1</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>Sungkyunkwan University)

### TS01F\_P\_2

#### Development of Triboelectric Nanogenerator Based Electrostatic Discharge Prevention System

Cheoljae Lee and Ju-Hyuck Lee

(DGIST)

### TS01F\_P\_3

#### Electromagnetic Induction Core of Energy Harvester with Augmented Magnetic Flux Gradient

Jihoon Park, Jinsoo Yang, and Dahoon Ahn

(Seoul National University of Science and Technology)

### TS01F\_P\_4

#### 10% Photoelectrochemical Water Splitting via Organic Light Absorbers with Ni-Heazlewoodite Electrocatalysts

Jaemin Park and Wooseok Yang

(Sungkyunkwan University)

### TS01F\_P\_5

#### Triboelectric Characteristics of Laser-Fabricate Crumbled MoS<sub>2</sub> and Application as Haptic Sensors

Junki Lee<sup>1</sup>, HyunSeung Kim<sup>1</sup>, Jiseul Park<sup>1</sup>, Seoung-Ki Lee<sup>2</sup>, and Chang Kyu Jeong<sup>1</sup>

(<sup>1</sup>Jeonbuk National University, <sup>2</sup>KIST)

### TS01F\_P\_6

#### Enhanced Security Systems through Innovative Implementation of Triboelectric Nanogenerator

Doohyun Han, Jaehee Shin, and Jinhyoung Park

(KOREATECH)

**TS01F\_P\_7**

**Delta-Doping Activation of Nanotunneling Junction Layer for Si Tandem Solar Cells Applications**

Inseung Lee and Keunjoo Kim

*(Jeonbuk National University)*

**TS01F\_P\_8**

**Utilization and Generalization of Triboelectric Nanogenerator's Energy Harvesting Ability for Simultaneous Energy Storage and Motion Sensing Applications**

Mandar Vasant Paranjape, Punnarao Manchi, Jun Kyu Lee, Venkata Siva Kavarthapu, Kurakula Anand, Sontyana Adonijah Graham, and Jae Su Yu

*(Kyung Hee University)*

**TS01F\_P\_9**

**Application of VO<sub>2</sub>(B)/V<sub>2</sub>O<sub>5</sub> Thin Film Thermistor for High Temperature Operation of Uncooled Microbolometer**

Jeongeun Mo<sup>1,2</sup>, Haeri Park<sup>1</sup>, Donghee Park<sup>1</sup>, Jeong Min Baik<sup>2</sup>, and Won Jun Choi<sup>1</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Sungkyunkwan University)*

**TS01F\_P\_10**

**Rotational Motion Converter for Wearable Powering Technologies**

Ji-Seok Kim and Il-Kwon Oh

*(KAIST)*

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# Technical Sessions

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## **[TS02] Nanomaterials for the Next-Generation Batteries**

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### **Theme: Nanomaterials and Nanotechnology for Next-Generation Batteries**

To usher in the era of carbon neutrality, early expansion of electric vehicles and energy storage systems is crucial, and for this purpose, the advancement of lithium secondary battery technology and the development of next-generation batteries are necessary. In the next-generation battery session, we are dealing with nanomaterials and nanotechnology to enhance the performance of next-generation batteries. We will discuss the latest research results and prospects for various materials, processes, and systems.

[TS02W1]

Nanomaterials for the Next-Generation Batteries I

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 306
Session Chair(s)	Ji-Won Jung (Univ. of Ulsan)

TS02W1\_O\_1 09:00–09:15

**Thermal Runaway Mechanism of Ni-Rich Cathode Full-Cell**  
Sugeun Jo<sup>1,2</sup>, Sungjae Seo<sup>1</sup>, Ikcheon Na<sup>1</sup>, Sebastian Kunze<sup>1</sup>, Munsoo Song<sup>1</sup>, Sung Pil Woo<sup>3</sup>, Song Kyu Kang<sup>2</sup>, San Hwang<sup>1</sup>, Won Bae Kim<sup>2</sup>, SoHee Kim<sup>3</sup>, and Jongwoo Lim<sup>1</sup>  
(<sup>1</sup>Seoul National University, <sup>2</sup>POSTECH, <sup>3</sup>Samsung SDI)

TS02W1\_O\_2 09:15–09:30

**Nanoscope Strain-Associated Lithium Diffusion in Single-Crystalline NMC Battery Particles**  
Danwon Lee<sup>1</sup>, Chihyun Nam<sup>1</sup>, Juwon Kim<sup>1</sup>, Bonho Koo<sup>1</sup>, Hyejeong Hyun<sup>1</sup>, Jinkyu Chung<sup>1</sup>, Sungjae Seo<sup>1</sup>, Munsoo Song<sup>1</sup>, Jaehung Song<sup>1</sup>, Daan Hein Alsem<sup>3</sup>, Norman J. Salmon<sup>3</sup>, Suyong Lee<sup>2</sup>, Namdong Kim<sup>2</sup>, David A. Shapiro<sup>4</sup>, and Jongwoo Lim  
(<sup>1</sup>Seoul National University, <sup>2</sup>POSTECH, <sup>3</sup>Hummingbird Scientific, <sup>4</sup>Lawrence Berkeley National Laboratory)

TS02W1\_I\_3 \*Invited 09:30–10:00

**Materials Processing to Create Fibrous Structures and its Application to Battery Manufacturing**  
Jae Chul Kim  
(Stevens Institute of Technology)

TS02W1\_I\_4 \*Invited 10:00–10:30

**Progress and Future Perspectives on Employing Electrospun Nanofibers for Advanced Energy Storage Systems**  
Jun Young Cheong  
(University of Glasgow)

## [TS02W2]

### Nanomaterials for the Next-Generation Batteries 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:25
Place	Room 306
Session Chair(s)	Wonhee Ryu (Sookmyung Women's Univ.)

**TS02W2\_O\_1**

15:40–15:55

**Advanced Lithium Sulfur-Batteries using Electrochemically Active  $\text{MoO}_3/\text{TiN}$ -Based Sulfur Host with Dynamically Enhanced Built-in Electric Field**

Jeongyoub Lee, Wooyoung Jeong, Soobin Lee, and Jooho Moon

*(Yonsei University)***TS02W2\_I\_2 \*Invited**

15:55–16:25

**Metal–Organic–Framework–Based Quasi–Solid–State Electrolytes for Lithium Batteries**

Panpan Dong, Xiahui Zhang, William Hiscox, Juejing Liu, Julio Zamora, Xiaoyu Li, Muqiao Su, Qiang Zhang, Xiaofeng Guo, John McCloy, and Min-Kyu Song

*(Washington State University)***TS02W2\_I\_3 \*Invited**

16:25–16:55

**Mapping and Modeling Physicochemical Fields in Solid-State Batteries**

Shou-Hang Bo

*(Shanghai Jiao Tong University)***TS02W2\_I\_4 \*Invited**

16:55–17:25

**High-Performance Sodium-Ion Battery using Copper Sulfide Anode and NASICON-Type Cathode**

Jong Min Yuk

*(KAIST)*

[TS02T3]

Nanomaterials for the Next-Generation Batteries 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 306
Session Chair(s)	Jinsoo Kim (KIER)

TS02T3\_I\_1    \*Invited

09:00–09:30

Direct Regeneration of Spent Battery Cathodes using Recyclable Electron Donors under Ambient Conditions

Minah Lee<sup>1,2</sup>

(<sup>1</sup>KIST, <sup>2</sup>POSTECH)

TS02T3\_I\_2    \*Invited

09:30–10:00

Advancements in Surface Engineering through Atomic Layer Deposition for Lithium-Ion Batteries

Jin Xie

(ShanghaiTech University)

TS02T3\_I\_3    \*Invited

10:00–10:30

Advanced Synchrotron-Based X-ray Characterization Studies of Next-Generation Battery Materials

Seongmin Bak

(Yonsei University)

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## [TS02] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS02W\_BP\_1

#### Screening Strategy of Ideal Quinone-Based RMs for Direct Cathode Lithiation of Spent Li-Ion Batteries

Hyun Ju Yoon, Suji Kim, and Won-Hee Ryu

(*Sookmyung Women's University*)

### TS02W\_BP\_2

#### Functional Group Control of Polarizable Molecular Dipoles as Interface Stabilizing Electrolyte Additive for Rapid Operative and Longer Lifespan Lithium Metal Batteries

ChaeYeong Son and Won-Hee Ryu

(*Sookmyung Women's University*)

### TS02W\_BP\_3

#### Binder-Free Oxide-Sulfide Composite Electrolyte Membrane for All-Solid-State Batteries

A-Yeon Kim<sup>1,2</sup>, Hyeon-Ji Shin<sup>1</sup>, Jun Tae Kim<sup>1</sup>, and Hun-Gi Jung<sup>1,3</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea University, <sup>3</sup>UST)

### TS02W\_BP\_4

#### The Cathode Material $\text{Na}_3\text{V}_{1.5}\text{Cr}_{0.4}\text{Fe}_{0.1}(\text{PO}_4)_3$ , Belonging to the NASICON-Type, Is Renowned for its Exceptional Performance in Sodiumion Batteries, Particularly for its High Voltage and High-Rate Capabilities

Deokhyeon Son and Jang-Yeon Hwang

(*Hanyang University*)

### TS02W\_BP\_5

#### Elucidating Redox Mediator-Assisted Relithiation Mechanisms for Direct Cathode Recycling of Spent Li-Ion Batteries

Suji Kim, Hyun Ju Yoon, and Won-Hee Ryu

(*Sookmyung Women's University*)

### TS02W\_BP\_6

#### Enhanced Dispersibility and Electrochemical Properties of Thick Dry Electrodes through Thermoplastic Binder-CNT Composite

Min Jeong Kim<sup>1</sup>, Jang-Yeon Hwang<sup>1</sup>, and Jung-Keun Yoo<sup>2</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>KIST)

### TS02W\_BP\_7

#### Improvement of Lithium-Ion Battery Performance through Siloxane Binder Application

Jun-Kyu Park<sup>1,2</sup>, Jin-Joo<sup>2</sup>, and Jung-Keun Yoo<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Kyungpook National University)

### TS02W\_BP\_8

#### Controlling Dendrite Growth in Sodium Metal Batteries using Tailored Gel Polymer Electrolytes

Da-Sol Kwon<sup>1</sup>, Jimin Shim<sup>2</sup>, and Minah Lee<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Seoul National University)

### TS02W\_BP\_9

#### Applying for the Thermoplastic Polyurethane (TPU) Blending Binder for High Energy Density Lithium-Ion Batteries

Min Sol Kim<sup>1</sup>, Jong Soon Kim<sup>1</sup>, and Jung-Keun Yoo<sup>2</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>KIST)

### TS02W\_BP\_10

#### Enhanced Li-Ion Conductivity by Directionally Ordered Oxygen Vacancies in Perovskite Oxide-Based Solid Electrolyte

Hyeon-Ah Ju<sup>1</sup>, Eun-Byeol Park<sup>1</sup>, Jaejin Hwang<sup>2</sup>, Young-Hoon Kim<sup>1</sup>, Jae Hyuck Jang<sup>3</sup>, Jaekwang Lee<sup>2</sup>, Jae-Hyun Shim<sup>4</sup>, and Young-Min Kim<sup>1</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Pusan National University, <sup>3</sup>KBSI, <sup>4</sup>Dongshin University)

### TS02W\_BP\_11

#### Weakly Solvating Solution-Based Chemical Prelithiation for Lithium-Ion Capacitors with High Energy Density

Seungyun Jeon<sup>1,2</sup>, Sehee Im<sup>1</sup>, Inyeong Kang<sup>1</sup>, Dongki Shin<sup>1</sup>, Seung-Ho Yu<sup>2</sup>, Minah Lee<sup>1</sup>, and Jihyun Hong<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea University)

### TS02W\_BP\_12

#### Stabilized Electrolyte Design for High-Voltage Co-Free NMX Cathode with CEI-Controlling

Myungeun Choi, Junseong Kim, and Jongsoon Kim

(Sungkyunkwan University)

TS02W\_BP\_13

**Highly Conductive and Durable  $\text{WO}_{3-x}$  Particles as Cathode Framework Stabilizing Additive for All-Solid-State Batteries**

Hyeon-Ju Song, Yoo-Jung Choi, and Won-Hee Ryu

*(Sookmyung Women's University)*

TS02W\_BP\_14

**Heterogeneous Oxide Composite Nanofiber as Robust and Efficient Catalyst for High-Performance Li- $\text{CO}_2$  Batteries**

Huiju Kim<sup>1</sup>, Dae-Kwon Boo<sup>2</sup>, Ji-Won Jung<sup>2</sup>, and Won-Hee Ryu<sup>1</sup>

*(<sup>1</sup>Sookmyung Women's University, <sup>2</sup>University of Ulsan)*

TS02W\_BP\_15

**Non-Precious Metal Based Dual Atom Catalysts Loaded on N-Doped Carbon Nanotubes for High Performance Li- $\text{O}_2$  Batteries**

Yeji Lim, Yoon Jeong Yoo, and Won-Hee Ryu

*(Sookmyung Women's University)*

TS02W\_BP\_16

**CEI Layer Formation by TPU-Based Binder for Improved Cyclability of  $\text{LiFePO}_4$  Lithium-Ion Batteries**

Jiny Lee<sup>1</sup>, Jong Soon Kim<sup>1</sup>, and Jung-Keun Yoo<sup>2</sup>

*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>KIST)*

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## [TS02] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS02T\_BP\_1

#### Mesoporous Silicon–Graphene Composite Anode for High-Performance Lithium–Ion Batteries

Subin Lee, Na–Yeong Kim, and Ji–Won Jung

*(University of Ulsan)*

### TS02T\_BP\_2

#### Preparation of Sagoe Starch Based Activated Porous Carbons as Cathode's Components for Lithium Sulfur Battery

Nicholas Jonathan<sup>1,2</sup>, Hans Kristianto<sup>3</sup>, Sang Ok Kim<sup>1,2</sup>, and Arenst Andreas Arie<sup>3</sup>

*(<sup>1</sup>KIST, <sup>2</sup>UST, <sup>3</sup>Parahyangan Catholic University)*

### TS02T\_BP\_3

#### Off–Stoichiometric Composition Strategy for High Structural Integrity in Co–Free Li–Rich Layered Cathode

Youngsu Lee and Kyu–Young Park

*(POSTECH)*

### TS02T\_BP\_4

#### Surface Roughness–Induced Enhancement of Binder Fibrillation Processability in Dry Electrode Manufacturing for Lithium–Ion Battery

Jonggyu Park<sup>1</sup>, Jeong–Keun Yoo<sup>2</sup>, and Kyu–Young Park<sup>1</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>KIST)*

### TS02T\_BP\_5

#### Effect of Elastic Framework for Shape Resilience Lithium–Ion Batteries

Jong–Heon Lim<sup>1</sup>, Jaehyun Kim<sup>2</sup>, Jaesub Kwon<sup>1</sup>, Kyoung Eun Lee<sup>1</sup>, Youngsu Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Janghyuk Moon<sup>2</sup>, and Kyu–Young Park<sup>1</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>Chung–Ang University)*

### TS02T\_BP\_6

#### 3–D Interconnected Porous Cu Current Collector for Anode–Free Lithium–Metal Batteries

Suji Kim<sup>1</sup>, MinJae Lee<sup>2</sup>, SeKwon Oh<sup>2</sup>, and Won–Hee Ryu<sup>1</sup>

*(<sup>1</sup>Sookmyung Women's University, <sup>2</sup>KITECH)*



**TS02T\_BP\_7**

**Surface Stabilization of High-Nickel Cathodes via Solvent-Free Mechano-fusion Process for Li-Ion Batteries**

Yoo-Jung Choi, Hyeon-Ju Song, and Won-Hee Ryu

*(Sookmyung Women's University)*

**TS02T\_BP\_8**

**Hierarchical Growth of Durable Carbon Nanotube Bundles from Graphite Interlayer Seeds for Free-Standing Oxygen Electrodes for Lithium-Oxygen Battery**

Yeji Lim, Fuxi Peng, Huiju Kim, Boran Kim, Hyun-Soo Kim, Zhenyu Wang, Zuowan Zhou, Jinyang Li, and Won-Hee Ryu

*(Sookmyung Women's University)*

**TS02T\_BP\_9**

**Revealing On-Demand Molecular Traps Effects of Electrostatic Covalent Organic Frameworks for High-Energy Li Metal Battery Electrodes**

Jae-Seung Kim<sup>1</sup>, Kyeong-Seok Oh<sup>2</sup>, Sodam Park<sup>2</sup>, Sang-Young Lee<sup>2</sup>, and Dong-Hwa Seo<sup>1</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>Yonsei University)*

**TS02T\_BP\_10**

**Complex Charge Transport of Carbon Network in Composite Cathode for Solid-State Batteries**

Juho Lee<sup>1,2</sup>, Hyeong-Jong Kim<sup>2</sup>, Chanhun Park<sup>2</sup>, Jingyu Choi<sup>2</sup>, Sung-kyun Jung<sup>2</sup>, and Jinsoo Kim<sup>1</sup>

*(<sup>1</sup>KIER, <sup>2</sup>UNIST)*

**TS02T\_BP\_11**

**Cycling Protocol for Mn-Based Disordered Rock-Salt Li-Ion Cathodes for Improved Cycling Stability**

DongHwa Seo

*(KAIST)*

**TS02T\_BP\_12**

**Coated Current Collector for All Solid State Battery**

Hyeon-Seong Oh<sup>1,2</sup> and Hun-Gi Jung<sup>1</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Yonsei University)*

**TS02T\_BP\_13**

**Facial Synthesis of Single Crystal Mo<sub>4</sub>P<sub>3</sub> Nanowires with Large D-Spacing for Easy Li + Ion Uptake**

Jeong In Lee, Seo Hyun Kim, Minjeong Shin, and Hyeuk Jin Han

*(Sungshin Women's University)*

## [TS02] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS02T\_P\_1

**Study on the Improvement of Rate Capability and Application as Anode Material of  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  using  $\text{NH}_4\text{F}$**

Il-Seop Jang<sup>1,2</sup>, Bo-Ye Song<sup>1,2</sup>, Eunhye Kim<sup>1,2</sup>, and Jinyoung Chun<sup>1</sup>

(<sup>1</sup>KICET, <sup>2</sup>Korea University)

### TS02T\_P\_2

**A Study on the Removal of Residual Silica in Waste Silicon, Nanopore Generation, and Enhancement of Electrochemical Properties using  $\text{NH}_4\text{F}$**

Il-Seop Jang<sup>1,2</sup>, Bo-Ye Song<sup>1,2</sup>, Byeong-Jun Ahn<sup>1,2</sup>, and Jinyoung Chun<sup>1</sup>

(<sup>1</sup>KICET, <sup>2</sup>Korea University)

### TS02T\_P\_3

**Effect of  $\text{Mg}^{2+}$  Doping on the Ionic Conductivity and Density Enhancement of von-Alpen Type NASICON Ceramics**

Gunhee Park<sup>1,2</sup>, Byeong-Jun Ahn<sup>1,2</sup>, Eun-Hye Kim<sup>1</sup>, and Jinyoung Chun<sup>1</sup>

(<sup>1</sup>KICET, <sup>2</sup>Korea University)

### TS02T\_P\_4

**Enabling Uniform Distribution of Carbon Nanotubes for Thick-Cathode in Lithium-Ion Batteries using Electrospray**

Ho-Jin Lee, Na-Yeong Kim, and Ji-Won Jung

(University of Ulsan)

### TS02T\_P\_5

**Zinc-Bridged Lithium on Carbon Nanofibers for Enhancing Anode-Free Li-Metal Battery Performance**

Ho-Jin Lee<sup>1</sup>, Ilgyu Kim<sup>1</sup>, Tae-Hyeon Pyo<sup>2</sup>, Sang-Joon Kim<sup>2</sup>, and Ji-Won Jung<sup>1</sup>

(<sup>1</sup>University of Ulsan, <sup>2</sup>KRICT)

### TS02T\_P\_6

**Scanning Transmission X-Ray Microscopy Study of In-Situ Annealing Effect on Cathode Primary Particles for Secondary Ion Batteries**

Hansol Jang<sup>1</sup>, Namdong Kim<sup>2</sup>, Changhoon Jung<sup>3</sup>, and Hyun-Joon Shin<sup>1</sup>

(<sup>1</sup>Chungbuk National University, <sup>2</sup>Pohang Accelerator Laboratory, <sup>3</sup>SAIT)

**TS02T\_P\_7**

**Construction of Dual Crosslinked Network Binder via Sequential Ionic Crosslinking for High-Performance Silicon Anodes**

Chao Chen

*(Jiaxing University)*

**TS02T\_P\_8**

**Refreshing Lithium Metal Anodes: Mechano-Thermal Milling for Native Passivation Layer Removal**

Sanghyeon Park and Hongkyung Lee

*(DGIST)*

**TS02T\_P\_9**

**Designing Durable Zn Anodes: The Efficacy of In-Situ Coated Metal Fluoride/Polymer Bi-Layers**

Jaewoong Han and Hongkyung Lee

*(DGIST)*

**TS02T\_P\_10**

**Characterization of Sulfonated Cross-Linked Reinforced Films for Polymer Electrolyte Fuel Cells (PEFCs) using Microporous Flat Sheet Membranes**

Suk-Yong Jang, Ji-Su Lee, and Sien-Ho Han

*(Tech University of Korea)*

**TS02T\_P\_11**

**Facile Synthesis of Si/rGO Composites based on Particle Size Differences with High Reversibility for Lithium Ion Batteries**

Wanseop Shin, Chaewon Kim, and Sang-Wha Lee

*(Gachon University)*

**TS02T\_P\_12**

**Atomic Layer Deposition for Lithium-Ion Battery Cathode Materials**

Chae-Woong Kim, Hyoug Kwon, Yonghyeon Kim, Junil Kim, Sungjun Jeong, and Hyngsang Park

*(ISAC Research)*

**TS02T\_P\_13**

**Synthesis of Nickel Fluoride (NiF<sub>2</sub>)/Porous Carbon Nanocomposites and their Electrochemical Properties as the Electrode of Li-Ion Batteries**

Gunhee Park<sup>1,2</sup>, Il-Seop Jang<sup>1,2</sup>, and Jinyoung Chun<sup>1</sup>

*(<sup>1</sup>KICET, <sup>2</sup>Korea University)*

**TS02T\_P\_14**

**Ni/LiF/C Nanocomposite as Pre-Lithiation Cathode Additive for High Energy Density Lithium-Ion Batteries**

Bo-Ye Song<sup>1</sup>, Gunhee Park<sup>1,2</sup>, Byeong-Jun Ahn<sup>1,2</sup>, and Jinyoung Chun<sup>1</sup>

(<sup>1</sup>KICET, <sup>2</sup>Korea University)

**TS02T\_P\_15**

**Synthesis of Sodium Cobalt Fluoride (NaCoF<sub>3</sub>) Nanocomposite and Electrochemical Performance as Lithium-Ion Batteries**

Bo-Ye Song<sup>1</sup>, Il-Seop Jang<sup>1,2</sup>, Eun-Hye Kim<sup>1</sup>, and Jinyoung Chun<sup>1</sup>

(<sup>1</sup>KICET, <sup>2</sup>Korea University)

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## [TS02] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS02F\_P\_1

#### Doping Engineering of Manganese on Cobalt Oxide in Particle Size-Controllable Compound Anode for Lithium-Ion Batteries

Hyunmin Na<sup>1</sup>, Na Yeong Kim<sup>1</sup>, Promoda Kumar Behera<sup>2,3</sup>, Ho-Jin Lee<sup>1</sup>, Jeong-Ho Park<sup>1</sup>, Lawrence Robert Msalilwa<sup>2</sup>, Jae-Woo Seo<sup>4</sup>, Seon-Jin Choi<sup>4</sup>, Jiyoung Lee<sup>5</sup>, Jun Young Cheong<sup>2,6</sup>, and Ji-Won Jung<sup>1</sup>  
 (<sup>1</sup>University of Ulsan, <sup>2</sup>University of Bayreuth, <sup>3</sup>Technical University of Liberec, <sup>4</sup>Hanyang University, <sup>5</sup>Northwestern University, <sup>6</sup>University of Glasgow)

### TS02F\_P\_2

#### Enhancing Durability and Atomization of Pt/C Catalyst for PEMFC MEA through Intense Pulsed Light Method

Hyunmin Na<sup>1</sup>, Hamin Shin<sup>2</sup>, Su-Ho Cho<sup>3</sup>, Ho-Jin Lee<sup>1</sup>, Jeong-Ho Park<sup>1</sup>, Dae-Kwon Boo<sup>1</sup>, and Ji-Won Jung<sup>1</sup>  
 (<sup>1</sup>University of Ulsan, <sup>2</sup>ETH Zurich, <sup>3</sup>NNFC)

### TS02F\_P\_3

#### $\beta$ -Chitin Separator via Centrifugal Spinning for Superior Aqueous Zinclon Batteries

Jeong-Ho Park, Myeong-Oh Song, Jungho Jin, and Ji-Won Jung  
 (University of Ulsan)

### TS02F\_P\_4

#### $\alpha$ -Chitin Separator via Filtration for Superior Aqueous Zinc-Ion Batteries

Jeong-Ho Park, Myeong-Oh Song, Jungho Jin, and Ji-Won Jung  
 (University of Ulsan)

### TS02F\_P\_5

#### Surface Flattening Molecular Dipole as Electrolyte Additive for Longer Lifespan Sodium-Metal Batteries

Seo-Young Jun, Chae Yeong Son, and Won-Hee Ryu  
 (Sookmyung Women's University)

### TS02F\_P\_6

#### A Surface Flattening and Interface Stabilizing Additive with Monovalent Polyanion Functional Groups for Longer Lifespan Lithium Metal Batteries

ChaeYeong Son, Seo-Young Jun, and Won-Hee Ryu  
 (Sookmyung Women's University)

### TS02F\_P\_8

#### Advancements in Aqueous Zinc-Ion Batteries using Electrospun Polyimide Separators with Al<sub>2</sub>O<sub>3</sub> ALD Coating

HaEun Baeg and Ji-Won Jung  
(University of Ulsan)

### TS02F\_P\_9

#### Utilizing Sulfurized Polyacrylonitrile Cathodes with Advanced Triple-Salt Carbonate Electrolytes Enhancing Performance in Li-S Batteries

Changki Jeon and Jang-Yeon Hwang  
(Hanyang University)

### TS02F\_P\_10

#### Machine Learning-Assisted Electron Energy Loss Spectroscopy Mapping for Silicon-Based Anode Materials of Lithium-Ion Batteries

Yuseong Heo<sup>1</sup>, Young-Hoon Kim<sup>1</sup>, Taewon Min<sup>1,2</sup>, Jae-Hyun Shim<sup>3</sup>, Jaekwang Lee<sup>2</sup>, and Young-Min Kim<sup>1</sup>  
(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Pusan National University, <sup>3</sup>Dongshin University)

### TS02F\_P\_11

#### Gas Evolution Kinetics in Overlithiated Positive Electrodes and its Impact on Electrode Design

Munsoo Song<sup>1</sup>, Danwon Lee<sup>1</sup>, Juwon Kim<sup>1</sup>, Subin Choi<sup>1</sup>, Ikcheon Na<sup>1</sup>, Sungjae Seo<sup>1</sup>, Sugeun Jo<sup>2</sup>, Chiho Jo<sup>3</sup>, and Jongwoo Lim<sup>1</sup>  
(<sup>1</sup>Seoul National University, <sup>2</sup>Pohang Accelerator Laboratory, <sup>3</sup>LG Energy Solution)

### TS02F\_P\_12

#### Effect of Iron Oxide Impurities on Activated Carbon Material in Electrochemical Supercapacitor Performances

Kye-yeol Lee<sup>1</sup>, S. Radhakrishnan<sup>2</sup>, and Byoung-Suhk Kim<sup>2</sup>  
(Jeonbuk National University)

### TS02F\_P\_13

#### A Facile Preparation of Nickel Bismuth Oxide as Negative Electrode Material for Enhanced Asymmetric Supercapacitor

Il-yeong Jeong<sup>1</sup>, Sivaprakasam Radhakrishnan<sup>2</sup>, and Byoung-Suhk Kim<sup>2</sup>  
(Jeonbuk National University)

### TS02F\_P\_14

#### Computational Study of Prussian Blue Analogues as a New Type of Sodium Solid Electrolytes for All-Solid-State Batteries

You-Yeob Song<sup>1</sup>, Taewon Kim<sup>2</sup>, Sang Hyeok Ahn<sup>2</sup>, Sung-Kyun Jung<sup>2</sup>, Hyun-Wook Lee<sup>2</sup>, and Dong-Hwa Seo<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>UNIST)

**TS02F\_P\_15**

**Impact of Varying Oxygen Levels in Upcycling of Spent NCM Cathode**

Jaehyun Noh<sup>1,2</sup>, Geunmin Jang<sup>1,3</sup>, Jayoung Kim<sup>1,2</sup>, Jeonghwan Song<sup>1,3</sup>, Jiwoo Kim<sup>1,2</sup>, Hayong Song<sup>1</sup>, Jinju Song<sup>1</sup>, Sangryun Kim<sup>2</sup>, Jiyoung Ma<sup>1</sup>, and Jung-Je Woo<sup>1</sup>

(<sup>1</sup>KIER, <sup>2</sup>GIST, <sup>3</sup>Chonnam National University)

**TS02F\_P\_16**

**Dry Electrode Technologies for High Energy Density Battery with Solid Polymer Electrolyte-Based Binders**

Min Jang<sup>1,2</sup>, Seok Ju Kang<sup>1</sup>, and Jinsoo Kim<sup>2</sup>

(<sup>1</sup>UNIST, <sup>2</sup>KIER)

**TS02F\_P\_17**

**Negative Impact of Polyvinylidene Fluoride Binder on NCM Cathode Material in Lithium-Ion Battery Recycling**

Geunmin Jang<sup>1,2</sup>, Jaehyun Noh<sup>1</sup>, Junghwan Song<sup>1</sup>, Jiwoo Kim<sup>1</sup>, Jinju Song<sup>1</sup>, Hayong Song<sup>1</sup>, Jaekook Kim<sup>2</sup>, Jiyoung Ma<sup>1</sup>, and Jung-Je Woo<sup>1</sup>

(<sup>1</sup>KIER, <sup>2</sup>Chonnam National University)

**TS02F\_P\_18**

**Fluorine-Free Binder-Based Dry Thick Electrodes toward Sustainable and Efficient LIBs**

Min Kyung Kim and Jinsoo Kim

(KIER)

**TS02F\_P\_19**

**Unveiling the Structure-Property Relationship in Solid Polymer Electrolyte based on Change of Charge Density by Lithium Salt Formulation for Solidstate Batteries**

Seung Min Lee and Jinsoo Kim

(KIER)

**TS02F\_P\_20**

**Enhanced Battery Electrode Protection via Etched Superhydrophobic Stainless Steel Surfaces**

Chenyao Huang and Dukhyun Choi

(Sungkyunkwan University)

### TS02F\_P\_21

#### Highly Active–Material–Concentrated Cathodes of Nickel and Cobalt–Free Cation–Disordered Rock–Salts for Li–Ion BatteriesNanocomposite

Eunryeol Lee<sup>1</sup>, Dae–Hyung Lee<sup>1,2</sup>, Stéphanie Bessette<sup>3</sup>, Sang–Wook Park<sup>1,2</sup>, Nicolas Brodusch<sup>3</sup>, Gregory Lazaris<sup>3</sup>, Hojoon Kim<sup>1,2</sup>, Rahul Malik<sup>4</sup>, Raynald Gauvin<sup>3</sup>, Dong–Hwa Seo<sup>1,2</sup>, and Jinhyuk Lee<sup>3</sup>

(<sup>1</sup>UNIST, <sup>2</sup>KAIST, <sup>3</sup>McGill University, <sup>4</sup>Natural Resources Canada)

### TS02F\_P\_22

#### Enhancing Structural Stability via Sb<sup>5+</sup> Substitution for High–Performance Potassium Ion Batteries

Junseong Kim, Myungeun Choi, and Jongsoon Kim

(Sungkyunkwan University)

### TS02F\_P\_23

#### Revamping O3–Type NaCrO<sub>2</sub> Cathodes: Exploring Cationic and Transition Metal Co–Substitution for Enhanced Performance in Sodium–Ion Batteries

Seonjge Ryu and Jang–Yeon Hwang

(Hanyang University)

### TS02F\_P\_24

#### Strategy for Stabilizing Solid Electrolyte Interphase in Postassium Metal Batteries using Potassium–Polysulfide

Seungwon Lee and Jang–Yeon Hwang

(Hanyang University)

### TS02F\_P\_25

#### Improving Fast–Charging Performance in Lithium–Ion Batteries with Innovative Dual–Layer Graphite Anode Design

Hyuntae Lee and Hongkyung Lee

(DGIST)

### TS02F\_P\_26

#### Enhancing Interfacial Kinetics for Extreme Fast Charging in Lithium–Ion Batteries using a LiPF<sub>6</sub>–Concentrated Electrolyte

Hyuntae Lee and Hongkyung Lee

(DGIST)

### TS02F\_P\_27

#### N–Doped Carbon Synthesis from *Chlorella vulgaris* with Urea and Melamine Doping with NaOH and K<sub>2</sub>CO<sub>3</sub> Activator

Angela Justina Kumalaputri, Ferdinandus Ivan, and Arenst Andreas

(Parahyangan Catholic University)



# Technical Sessions

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## **[TS03] Nanotechnology for Eco-friendly Energy**

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### **Theme: Nanotechnology for Next generation Photovoltaics, Photoelectrochemical Systems, Photocatalysts, Solar Fuel, Hydrogen Production and Storage**

Nanotechnology has been making important breakthroughs in the solar cell and systems for hydrogen production. For the sustainable future, solar energy should be used for electricity generation and direct energy/fuel conversion. For example, solar-to-fuel conversion is an appealing strategy to produce environmentally friendly fuels and attain sustainable energy systems. Additionally, to fabricate high efficient, stable solar cells, nanotechnology is necessary in the design of multiscale architectures and control of interface. This session will cover broad topic of solar driven or based devices for energy production and conversion. It includes perovskite solar cell, electrochemical cell, electrocatalysts, photocatalyst, photoelectrochemical cell, solar fuel technology and materials for hydrogen production and storage.

### [TS03W1]

#### Nanotechnology for Eco-friendly Energy 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 209A
Session Chair(s)	Jihun Oh (KAIST)

#### TS03W1\_I\_1 \*Invited 09:00–09:30

**Rational Designs of Metal/Semiconductor Heterojunction Catalysts, Electrocatalysts, and Photoanodes using Multi-Scale Simulations and Machine Learning**

Heechae Choi

(Xi'an Jiaotong-Liverpool University)

#### TS03W1\_O\_2 09:30–09:45

**Efficient Electrocatalyst for Hydrogen Evolution on Porous Polymer Support**

Javeed Mahmood

(KAUST)

#### TS03W1\_O\_3 09:45–10:00

**Tailoring Schottky Barriers and Active Sites in Bi-Metallic Cluster Mesoporous Carbon Nitride Heterostructures Nanocomposite for Hydrogen Evolution with In-Situ Insights**

V. Navakoteswara Rao<sup>1,2</sup>, Jun-Mo Yang<sup>2</sup>, and Kim Sang-Jae<sup>1</sup>

(<sup>1</sup>Jeju National University, <sup>2</sup>NNFC)

#### TS03W1\_O\_4 10:00–10:15

**Stable Hydrogen Evolution Reaction in Perovskite Based Photocathode**

Chang-Seop Jeong, Wooyong Jeong, Juwon Yun, and Jooho Moon

(Yonsei University)

#### TS03W1\_O\_5 10:15–10:30

**Hybrid Perovskite-Based Photoelectrochemical Co-Planar Cell for LargeScale Solar Hydrogen Production**

Wooyong Jeong, Gyumin Jang, Juwon Yun, Chang-Seop Jeong, Young Sun Park, Hyungsoo Lee, Jaehyun Son, Chan Uk Lee, Jeongyoub Lee, Junwoo Lee, Seongyeon Yang, Soobin Lee, Subin Moon, and Jooho Moon

(Yonsei University)

## [TS03W2]

### Nanotechnology for Eco-friendly Energy 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:55
Place	Room 209A
Session Chair(s)	Segi Byun (KIER)

<b>TS03W2_I_1</b>	<b>*Invited</b>	<b>15:40–16:10</b>
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**Single Atom Catalysts for Efficient and Selective Electrochemical CO<sub>2</sub> Reduction**

Jihun Oh

*(KAIST)*

<b>TS03W2_O_2</b>		<b>16:10–16:25</b>
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**Enhancing CO Oxidation Activity through Support Size Modulation of Pt Single Atom Catalysts Supported on Pt-CeO<sub>x</sub>-TiO<sub>2</sub>**

Jieun Yun, Eunji Kang, Hyuk Choi, Ju Hyeok Lee, Hongjin Park, and Hyun You Kim

*(Chungnam National University)*

<b>TS03W2_O_3</b>		<b>16:25–16:40</b>
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**Influence of Center Atom of Ionic Liquids on the Performance of the Lithium-Mediated Electrochemical Ammonia Synthesis**

Jinwoo Chu, Sungbin Yang, and Byungha Shin

*(KAIST)*

<b>TS03W2_I_4</b>	<b>*Invited</b>	<b>16:40–17:10</b>
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**Electrochemical Impedance Spectroscopy as Tool for Elucidating Electrocatalytical Reaction Mechanisms for Energy Application**

Hyacinthe Randriamahazaka

*(Université Paris Cité)*

<b>TS03W2_O_5</b>		<b>17:10–17:25</b>
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**Green Innovation in Semiconductor Production: Low-Carbon Ozone from PEM Electrolytic Stacking**

Wasim Abbas, Jyun-Wei Yu, and Guo-bin Jung

*(Yuan Ze University)*

TS03W2\_O\_6

17:25–17:40

**Multilayered Thermoelectric Films Derived from Conducting Polymers**

Nicolás Menéndez, Rafael Muñoz-Espí, Andrés Cantarero, Mario Culebras, and Clara M Gómez

*(University of Valencia)*

TS03W2\_O\_7

17:40–17:55

**Lignin-Derived Hydrogels and Membranes for Efficient Energy Harvesting**

Muhammad Muddasar<sup>1,2</sup>, Nicolás Menéndez<sup>2</sup>, Andrés Cantarero<sup>2</sup>, Clara Gómez<sup>2</sup>, Maurice N. Collins<sup>1,4</sup>, and Mario Culebras<sup>2</sup>

*(<sup>1</sup>University of Limerick, <sup>2</sup>University of Valencia, <sup>3</sup>Advanced Materials and BioEngineering Research)*

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## [TS03T3]

### Nanotechnology for Eco-friendly Energy 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 209A
Session Chair(s)	Jin Young Kim (UNIST)

TS03T3\_I\_1    **\*Invited**    09:00–09:30

#### Highly Efficient Organic Photovoltaics under Indoor Light Conditions

Jae Won Shim

*(Korea University)*

TS03T3\_I\_2    **\*Invited**    09:30–10:00

#### High Performance Electrodes and Carrier Transport Layers for Flexible/Foldable Photovoltaic Modules

Wallace C. H. Choy

*(The University of Hong Kong)*

TS03T3\_O\_3    10:00–10:15

#### Boosting Open-Circuit Voltage in $\text{Sb}_2(\text{S,Se})_3$ Solar Cells via Additive Assisted Hydrothermal Deposition Method

Yazi Wang, Seunghwan Ji, and Byungha Shin

*(KAIST)*

TS03T3\_O\_4    10:15–10:30

#### Rapid Charge Transport of $\text{Sb}_2(\text{S,Se})_3$ Photocathode via Self-Assembled Monolayer Enabling High-Performance Unassisted Solar Water Splitting

Soobin Lee, Jeongyoub Lee, Wooyong Jeong, Chang-Seop Jeong, Hyungsoo Lee, Young Sun Park, Juwon Yun, Subin Moon, Jun Hwan Kim, Jaehyun Son, and Jooho Moon

*(Yonsei University)*

### [TS03T4]

#### Nanotechnology for Eco-friendly Energy 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:15
Place	Room 209A
Session Chair(s)	Byungha Shin (KAIST)

#### TS03T4\_I\_1 \*Invited 14:00–14:30

##### Interface Geometry and Intra-Crystal Disorder in Perovskite Solar Cells

Yuanyuan Zhou  
(*HKUST*)

#### TS03T4\_O\_2 14:30–14:45

##### Geometric Tailoring of Grain Boundaries Grooves in Perovskite Solar Cells

Mingwei Hao<sup>1</sup> and Yuanyuan Zhou<sup>2</sup>  
(<sup>1</sup>*Hong Kong Baptist University*, <sup>2</sup>*HKUST*)

#### TS03T4\_O\_4 14:45–15:00

##### Passivation of Pb-Related Defects by Chelation Effect of Carboxylic Acid for Stable Perovskite Solar Cells

Seongheon Kim<sup>1</sup>, Seong Ho Cho<sup>2</sup>, Kiwan Jeong<sup>3</sup>, Jieun Lee<sup>1</sup>, Yonghoon Jung<sup>1</sup>, Mansoo Choi<sup>1</sup>, and Yun Seog Lee<sup>1</sup>  
(<sup>1</sup>*Seoul National University*, <sup>2</sup>*MIT*, <sup>3</sup>*Hanwha Q CELLS*)

#### TS03T4\_O\_5 15:00–15:15

##### Base Doping Process to Improve Hole Transport Layer Characteristics of Lead-Tin Based Perovskite Solar Cells

Jungchul Yun and Sangwook Lee  
(*Kyungpook National University*)

## [TS03] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS03W\_BP\_1

#### Bioresorbable Energy-Generating Skin Capable of Dual-Mode Tactile Perception

Shengyou Li, Kaiying Zhao, Guangtao Zan, and Cheolmin Park

(Yonsei University)

### TS03W\_BP\_2

#### Nanostructuring of Ir-Based Complex Oxide for Maximizing Surface Amorphization Enables Efficient and Stable Oxygen Evolution Reaction

Siyeon Kim, Gyu Rac Lee, and Yeon Sik Jung

(KAIST)

### TS03W\_BP\_3

#### Enhanced Catalytic Activity and Selectivity of Platinum supported on Ditungsten Oxide Electride for Chlorine Evolution Reaction

Seongsu Choi, Hanhwi Jang, and Yeon Sik Jung

(KAIST)

### TS03W\_BP\_4

#### Facial Synthesis of Mo<sub>4</sub>P<sub>3</sub> Nanowires for 2e<sup>-</sup> Oxygen Reduction Reaction

Seo Hyun Kim<sup>1</sup>, Changkyu Hwang<sup>2</sup>, Jong Min Kim<sup>2</sup>, and Hyeuk Jin Han<sup>1</sup>

(<sup>1</sup>Sungshin Woman's University, <sup>2</sup>KIST)

### TS03W\_BP\_5

#### Electrochemical Synthesis of Ammonia via Nitrogen Reduction and Oxygen Evolution Reactions at Intermediate Temperature

Hizkia Manuel Vieri<sup>1</sup> and Sun Hee Choi<sup>1,2</sup>

(<sup>1</sup>KIST, <sup>2</sup>UST)

### TS03W\_BP\_6

#### Catalytic Insights into Ammonia Decomposition: Single-Atom Ru and Ru Nanoparticle Formation on $\text{MgAl}_2\text{O}_4$ support

Solicha Hanifah<sup>1,2</sup>, Jin Su Kim<sup>1</sup>, Beom-Sik Kim<sup>3</sup>, Chang Houn Rhee<sup>3</sup>, and Hyuntae Sohn<sup>1,2</sup>

(<sup>1</sup>KIST, <sup>2</sup>UST-KIST, <sup>3</sup>POSCO)

### TS03W\_BP\_7

#### $\text{TiO}_2$ – rGO Composite Films decorated with Gold Nanoparticles for Electrocatalytic Hydrogen Evolution

Imanzhussip Serkul, Kuralay Rustembekkyzy, and Timur Sh. Atabaev

(Nazarbayev University)

### TS03W\_BP\_8

#### Suppressing $\text{Sn}^{2+}$ Oxidation in Perovskite Precursor Solution using Sustainable Reductant for Stable Sn-Pb Mixed Perovskite Solar Cells

Doyun Im<sup>1</sup>, Sung Woong Yang<sup>1</sup>, Yeonghun Yun<sup>2</sup>, Jungchul Yun<sup>1</sup>, Jina Jung<sup>1</sup>, Rajendra Kumar Gunasekaran<sup>1</sup>, and Sangwook Lee<sup>1</sup>

(<sup>1</sup>Kyungpook National University, <sup>2</sup>Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)

### TS03W\_BP\_9

#### Multi-Facet Passivation of Silver Bismuth Sulfide Colloidal Quantum Dot Suppressed the Voltage Loss in Lead-Free Photovoltaic

Dongeon Kim<sup>1</sup>, Gaeun Cho<sup>1,2</sup>, Han Seul Kim<sup>3</sup>, and Se-Woong Baek<sup>1</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST, <sup>3</sup>Chungbuk National University)

### TS03W\_BP\_10

#### Comparison of Photothermal Performance of Metal Nanoparticles

Chanho Eum<sup>1</sup> and Dong-Kwon Lim<sup>1,2</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST)

### TS03W\_BP\_11

#### Unassisted Photoelectrochemical $\text{H}_2\text{O}_2$ Production with in Situ Glycerol Valorization using $\alpha\text{-Fe}_2\text{O}_3$

Sarang Kim, Dongrak Oh, and Ji-Wook Jang

(UNIST)



## [TS03] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS03T\_BP\_1

#### Operando Monitoring of VOCs Photodegradation Reaction and Air Purifying Simulation under Atmospheric Moisture Control

Gahye Shin and Wooyul Kim

(KENTECH)

### TS03T\_BP\_2

#### Synthesis of Porous Thermoelectric PEDOT:PSS for Thermal Insulation and Efficient Environment-Friendly Energy Harvesting

Jeong Seob Yun and Sang Hyuk Im

(Korea University)

### TS03T\_BP\_3

#### Grain Boundary Passivation for Wide Bandgap Sub-Cell of Perovskite Tandem Solar Cells using Inorganic Potassium Lead Halide

Sunwoo Kim<sup>1</sup>, Doyun Im<sup>1</sup>, Yeonghun Yun<sup>2</sup>, Devthade Vidyasagar<sup>1</sup>, and Sangwook Lee<sup>1</sup>

(<sup>1</sup>Kyungpook National University, <sup>2</sup>Helmholtz-Zentrum Berlin für Materialien und Energie GmbH)

### TS03T\_BP\_4

#### Advancing Energy Harvesting and Storage with ZnO-PTFE Composite Thin Films

Swathi Ippili<sup>1</sup>, Venkatraju Jella<sup>1</sup>, Subhashree Behera<sup>1</sup>, Hyun-Suk Kim<sup>2</sup>, and Soon-Gil Yoon<sup>1</sup>

(<sup>1</sup>Chungnam National University, <sup>2</sup>Dongguk University)

### TS03T\_BP\_5

#### Efficient Photocatalytic Reverse Electrodialysis Cell for Simultaneous Electricity Generation and Degradation of Tetracycline Hydrochloride

Shristi Bevinakatti, Jung Hwan Kim, and Jae-Woo Park

(Hanyang University)

### TS03T\_BP\_6

#### Improved PEC Water Splitting Performance using Type-II Heterostructure based on NiO/InGaN Nanorods

Yun-Hae Shim, Na-Hyun Bak, Kedhareswara Sairam Pasupuleti, Roshani Awanthika Jayarathna, Isak Lee, Eui-Tae Kim, and Moon-Deock Kim

*(Chungnam National University)*

### TS03T\_BP\_7

#### Exploring BZCYYb Synthesis Methods and Sintering Temperature Variations in Proton Conducting Fuel Cells

Owen Khosashi, Emilio Audasso, Hizkia Manuel Vieri, and Sun-Hee Choi

*(KIST)*

### TS03T\_BP\_8

#### Nonstoichiometric Pt-CeO<sub>x</sub> Janus-type Nanoarchitecture for Highly Efficient and Durable Polymer Electrolyte Membrane Fuel Cell

Juyoung An<sup>1</sup>, Ho Young Kim<sup>2</sup>, Jin Young Kim<sup>3</sup>, and Yeon Sik Jung<sup>1</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>Sangmyung University, <sup>3</sup>KIST)*

### TS03T\_BP\_10

#### Selective Reactivity-Assisted Sacrificial Additive Coating for Surface Passivation of Wide Bandgap Perovskite Solar Cells with Cesium Tetrafluoroborate

Jaehyuk Koh<sup>1</sup>, Daehan Kim<sup>1</sup>, Sang Woo Park<sup>2</sup>, Hyungjun Kim<sup>1</sup>, Ki-Ha Hong<sup>2</sup>, and Byungha Shin<sup>1</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>Hanbat National University)*

### TS03T\_BP\_11

#### Photoelectrochemical Device based on a Halide Perovskite Solar Cell Protected by a Single Crystal TiO<sub>2</sub>

Choongman Moon, Jaehyuk Koh, and Byungha Shin

*(KAIST)*

## [TS03] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS03T\_P\_1

**Optimizing the Growth Rate of Zn(O,S) Buffer Layers through Zinc Sulfate Concentration Variations in Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells: A Chemical Bath Deposition Approach**

Woo-Jung Lee<sup>1,2</sup>, Dae-Hyung Cho<sup>1,2</sup>, Tae-Ha Hwang<sup>1</sup>, and Yong-Duck Chung<sup>1,2</sup>

(<sup>1</sup>ETRI, <sup>2</sup>UST)

### TS03T\_P\_2

**Investigating the Role of Post-Deposition Treatment Materials on the Defect Mitigation Process in Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells: An Empirical Approach**

Woo-Jung Lee<sup>1,2</sup>, Dae-Hyung Cho<sup>1,2</sup>, Tae-Ha Hwang<sup>1</sup>, Kwangsik Jeong<sup>3</sup>, Rina Kim<sup>1</sup>, Soyoung Lim<sup>1</sup>, Mangu Kang<sup>1</sup>, and Yong-Duck Chung<sup>1,2</sup>

(<sup>1</sup>ETRI, <sup>2</sup>UST, <sup>3</sup>Yonsei University)

### TS03T\_P\_3

**Surface Ion-Mediated Synthesis of Monodisperse Cobalt Nanoparticles/Molybdenum Oxide Heterostructures as Electrocatalysts for Hydrogen Evolution Reaction**

Lichun Liu

(Jiaxing University)

### TS03T\_P\_4

**Study on the Properties of Mg-Based Hydrogen Storage Alloy using Ni/Al<sub>2</sub>O<sub>3</sub> Catalyst**

Young Jun Kwak and Ki-Tae Lee

(Jeonbuk National University)

### TS03T\_P\_5

**Utilizing Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub> MXene Nanosheets as Potential Interfacial Components in Electrochemical Capacitors**

Segi Byun<sup>1</sup>, Hyewon Hwang<sup>2</sup>, Seoyeon Yuk<sup>2</sup>, and Dongju Lee<sup>2</sup>

(<sup>1</sup>KIER, <sup>2</sup>Chungbuk National University)

**TS03T\_P\_6**

**Enhancement of Photocatalytic Properties of CdS Composite through its Structural Modification via Citrate Addition**

KiSeong Lim, Abhijit N. Kadam, and Sang-Wha Lee

*(Gachon University)*

**TS03T\_P\_7**

**Tailoring Bandgap Grading via a Hybrid Growth Method to Achieve  $\text{Sb}_2(\text{S,Se})_3$  Solar Cells Approaching 8% Efficiency**

Seunghwan Ji, Yazi Wang, and Byungha Shin

*(KAIST)*

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## [TS03] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS03F\_P\_1

#### Green Method to Prepare Pure $\delta$ -FAPbI<sub>3</sub> Crystals for Fabrication of Highly Efficient Perovskite Solar Cells

Jin Kyong Park<sup>1</sup>, Jin Hyuck Heo<sup>1</sup>, Woo-Sik Kim<sup>2</sup>, and Sang Hyuk Im<sup>1</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Kyung Hee University)

### TS03F\_P\_2

#### Compositional Design for High-Efficiency All-Inorganic Tin Halide Perovskite Solar Cells

Jin Hyuck Heo<sup>1</sup>, Ki-Ha Hong<sup>2</sup>, and Sang Hyuk Im<sup>1</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Hanbat National University)

### TS03F\_P\_3

#### Low-Temperature Synthesis of Triple-Cation Tin-Lead Perovskite Single Crystals for Narrow Bandgap Solar Cells

Rajendra Kumar Gunasekaran, Jihoon Nam, Jungchul Yun, Myeong-geun Choi, and Sangwook Lee

(Kyungpook National University)

### TS03F\_P\_4

#### A Linear Trinuclear Acetate Bridged Cobalt Complex Containing Pyridine-Based Bicompartamental Ligand: Synthesis, Structural, Magnetic, and Electrocatalytic Oxygen Evolution Studies

Sujoy Bandyopadhyay and Hyosung choi

(Hanyang University)

### TS03F\_P\_5

#### Enhancing Photocatalytic Efficiency with Graphene-Based TiO<sub>2</sub> Nanocomposites

Yujin Nam, June Soo Kim, Maeum Han, Seung Deok Kim, Jae Yong Lee, Noah Jang, Hyunjun Kim, Da Ye Kim, and Seong Ho Kong

(Kyungpook National University)

### TS03F\_P\_9

#### Effects of Cs-Post Deposition Treatment for Low-Temperature Single Grading Cu(In, Ga)Se<sub>2</sub> Thin Film Solar Cells

JuHee Lee, Seunghwan Ji, Yazi Wang, and Byungha Shin

(KAIST)

### TS03F\_P\_10

#### Monolithically Integrated BiVO<sub>4</sub>/Si Tandem Devices for Self-Sustained Photoelectrochemical Water Splitting

Jihong Min, Gihun Jung, and Byngha Shin

(KAIST)

### TS03F\_P\_11

#### Designing Homogeneous Alloy Nanoparticles Catalyst for High Performance Electrochemical Ammonia Synthesis via Rapid Joule Heating

Jinpil Ha<sup>1</sup>, Chansol Kim<sup>1</sup>, Ji-Yoon Song<sup>1</sup>, Aqil Jamal<sup>2</sup>, Issam Gereige<sup>2</sup>, and Hee-Tae Jung<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>Saudi Aramco)

### TS03F\_P\_12

#### Enhanced Photocatalytic Performance of Zinc Oxide-Graphene Nanocomposites for Environmental and Energy Applications

Noah Jang, Maeum Han, June Soo Kim, Hyunjun Kim, Da Ye Kim, Yujin Nam, and Seong Ho Kong

(Kyungpook National University)

### TS03F\_P\_13

#### 3D Nanostructured Iridium-Free Oxide Catalyst for Durable Acidic Water Splitting

Pierre Yosia Edward Koraag, Gyu Rac Lee, and Yeon Sik Jung

(KAIST)

### TS03F\_P\_14

#### Color Filters for Thin-Film Solar Cells utilizing Indium-Tin-Oxide with Vertically Controlled Tin Content

Dae-Hyung Cho<sup>1,2</sup>, Rina Kim<sup>1</sup>, Woo-Jung Lee<sup>1,2</sup>, Tae-Ha Hwang<sup>1</sup>, Soyoung Lim<sup>1,2</sup>, Mangu Kang<sup>1</sup>, and Yong-Duck Chung<sup>1,2</sup>

(<sup>1</sup>ETRI, <sup>2</sup>UST)

**TS03F\_P\_15**

**Enhanced Conductivity in Transparent Electrodes using Metal Microfiber Networks for Flexible Thin-Film Solar Cells**

Dae-Hyung Cho<sup>1,2</sup>, Woo-Jung Lee<sup>1,2</sup>, Tae-Ha Hwang<sup>1</sup>, Jungwoo Huh<sup>3</sup>, Sam S. Yoon<sup>3</sup>, and Yong-Duck Chung<sup>1,2</sup>

(<sup>1</sup>ETRI, <sup>2</sup>UST, <sup>3</sup>Korea University)

**TS03F\_P\_16**

**Colorful Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells using Composition Controlled Zn(O<sub>1-x</sub>S<sub>x</sub>) Stacked Optical Filters**

Dae-Hyung Cho<sup>1,2</sup>, Woo-Jung Lee<sup>1,2</sup>, Tae-Ha Hwang<sup>1</sup>, and Yong-Duck Chung<sup>1,2</sup>

(<sup>1</sup>ETRI, <sup>2</sup>UST)

**TS03F\_P\_17**

**Harnessing Solar-Electrochemical Catalysis for Microplastic Degradation and Hydrogen Generation in Seawater**

Hosub Bae<sup>1</sup> and Wonyong Choi<sup>2</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>KENTECH)

**TS03F\_P\_19**

**Ionic Hydrogel-Based Moisture Electric Power Generator for Next Generations Autonomous IoTs**

Swapnil Shital Nardekar, Vijayakumar Elumalai, Monunith Anithkumar, Jyoti Prakash Das, B. S. Madhuri, Vishwanathan Ravichandran, and Sang-Jae Kim

(Jeju National University)





# Technical Sessions

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## **[TS04] Hybrid Nanomaterials for Next Generation Convergence Technology**

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### **Theme: Innovating Hybrid Nanomaterials for the Next Paradigm of Technology and Industry**

The key agenda for the recent progress in converging nanotechnology and the successful development of the 4th industrial revolution can include energy, environment, bio, nanoelectronic devices, sensors, and information technology. Hybrid nanomaterials are critical elements in such inter-/multi-disciplinary research and development areas. In this session, we first discuss the eye-opening advance in the design, synthesis, analysis, and application of next-generation hybrid nanomaterials, focusing on multidisciplinary applications and providing a comprehensive overview of the future outlook.

## [TS04T4]

### Hybrid Nanomaterials for Next Generation Convergence Technology I

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 306
Session Chair(s)	Hansang Kwon (Pukyong Nat'l Univ.)

**TS04T4\_I\_1 \*Invited** 14:00–14:30

**Effects of Inoculation of Heterogeneous Nucleation Site Particles on Microstructure and Mechanical Properties of Additively Manufactured Light Metals**

Yoshimi Watanabe

*(Nagoya Institute of Technology)*

**TS04T4\_I\_2 \*Invited** 14:30–15:00

**Energy-Harvesting and Mass Sensor Performance of Structurally Designed Iron-Cobalt Magnetostrictive Alloy**

Hiroki Kurita

*(Tohoku University)*

**TS04T4\_I\_3 \*Invited** 15:00–15:30

**Rare Earth Alloy Nanopowder Prepared by Induction Thermal Plasma Process for Developing High Performance Permanent Magnet**

Kwangjae Park

*(AIST)*

## [TS04T5]

### Hybrid Nanomaterials for Next Generation Convergence Technology 2

Date & Time	July 4(Thu.), 2024 / 15:40-16:40
Place	Room 306
Session Chair(s)	Kwangjae Park (AIST)

**TS04T5\_I\_1    \*Invited** 15:40-16:10

#### **Fabrication and Evaluation of Metal Matrix Composites Enhanced with Nano/Micro Reinforcements**

Seungchan Cho, Junghwan Kim, Sang-Bok Lee, and Sang-Kwan Lee

*(KIMS)*

**TS04T5\_I\_2    \*Invited** 16:10-16:40

#### **Control of Nanostructure to Manipulate Shape Memory Behavior of Laser 3D Printed Fe-Mn-Si Alloy**

Dohyung Kim<sup>1</sup> and Wookjin Lee<sup>2</sup>

*(<sup>1</sup>KITECH, <sup>2</sup>Pusan National University)*

## [TS04] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS04W\_BP\_1

#### Research on the Development of Aluminum–Nano Carbon Composite Materials for Aviation Cables Manufactured by Hot Extrusion

Chan Yang Lee, Min Chul Oh, and Geon Hong Kim

*(Institute for Advanced Engineering)*

### TS04W\_BP\_2

#### Randomly Oriented MoS<sub>x</sub> Clusters Based Anticounterfeiting Tags Induced by Capillary and Marangoni Flow

Changgyun Moon and Sunkook Kim

*(Sungkyunkwan University)*

### TS04W\_BP\_3

#### Investigation of the Mechanical Properties of Nano–Diamond Dispersed Epoxy Composites

Ji Hoon Min, Jihun Mun, and Sungwook Joo

*(Gyeongbuk Hybrid Technology Institute)*

### TS04W\_BP\_4

#### Development of Novel Functional Hydrophobic Coatings Enhanced with Detonation Nano–Diamond Powders

Ji Hoon Min<sup>1</sup>, Yeon Jung Kwak<sup>2</sup>, Jihun Mun<sup>1</sup>, and Sungwook Joo<sup>1</sup>

*(<sup>1</sup>Gyeongbuk Hybrid Technology Institute, <sup>2</sup>View Interior)*

### TS04W\_BP\_5

#### Fabrication and Properties Analysis of Al–SUS Functionally Graded Materials by Spark Plasma Sintering

Kyungju Kim<sup>1,2</sup>, Myunghoon Cho<sup>1,2</sup>, Seungchan Cho<sup>3</sup>, and Hansang Kwon<sup>1,2</sup>

*(<sup>1</sup>Pukyong National University, <sup>2</sup>Next Generation Materials Co., Ltd., <sup>3</sup>KIMS)*

TS04W\_BP\_6

**Fabrication of the Carbon Nanotube-Reinforced Aluminum Composite Pipe for Air Conditioning and Heating System by Extrusion Method**

Kyungju Kim<sup>1,2</sup>, Myunghoon Cho<sup>1,2</sup>, Seungchan Cho<sup>3</sup>, and Hansang Kwon<sup>1,2</sup>

(<sup>1</sup>*Pukyong National University*, <sup>2</sup>*Next Generation Materials Co., Ltd.*, <sup>3</sup>*KIMS*)

TS04W\_BP\_7

**Hybrid Design of Cu-Steel Dissimilar Weld Geometry for Li-Ion Battery Pack Manufacturing using Electroplating and Single-Mode Fiber Laser**

Jae-Hyeon Park<sup>1</sup>, Myung-Jin Kim<sup>2</sup>, Heeshin Kang<sup>3</sup>, and Eun-Jun Chun<sup>1</sup>

(<sup>1</sup>*Pukyong National University*, <sup>2</sup>*HUBIS Co., Ltd.*, <sup>3</sup>*KIMM*)

TS04W\_BP\_8

**Solidification Cracking Susceptibilities of Hafnium-Free 247LC Superalloy for Potential WAAM Repair Process**

Seong-Jin Lee<sup>1</sup>, Seong-Moon Seo<sup>2</sup>, and Eun-Joon Chun<sup>1</sup>

(<sup>1</sup>*Pukyong National University*, <sup>2</sup>*KIMS*)

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## [TS04] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS04T\_P\_1

**Enhanced Tellurium Field-Effect Phototransistors Utilizing Chemical Solution Deposited Ferroelectric La-Doped HfO<sub>2</sub> on Silicon**

Joo-on Oh, Uisik Jeong, and Sunkook Kim  
(*Sungkyunkwan University*)

### TS04T\_P\_2

**Inhibiting Intermetallic Compound (IMC) Growth in Al/Cu Composites by Nanodiamond Addition for Power Conductor Materials**

Wonho Yoon, Changtaeg Seo, Junsoong Lee, Minki Kim, Joongtak Back, and Sungwook Jo  
(*Gyeongbuk Hybrid Technology Institute*)

### TS04T\_P\_3

**Fabrication of Flexible Pressure Sensor using Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub> MXene Nanosheets and Polymer-MXene Nanocomposites**

Daegwon Noh and Eunsoon Oh  
(*Chungnam National University*)

### TS04T\_P\_4

**AE Parameter Correlation Characteristics during Fatigue and Burst Test of the Type 4 CFRP Winding Hydrogen Storage Tank**

Jaesung Kim  
(*Institute for Advanced Engineering*)

### TS04T\_P\_5

**Low-Magnetic-Field Alignment of Carbon Fibers in Polymer Matrix towards High-Performance Thermal Interface Materials**

Seok-Hwan Chung, Jong Tae Kim, Jeongmin Kim, and Dong Hwan Kim  
(*DGIST*)

### TS04T\_P\_6

**Synthesis and Characterization of Nanostructured Coatings for Enhanced Performance of Push Rods in Hybrid Vehicles**

Wang Ryeol Kim, Sungbo Heo, and In-Wook Park  
(*KITECH*)

TS04T\_P\_7

**Mechanical Property of Cu-Cr Composites by a Spark Plasma Sintering**

Yu-Gyun Park<sup>1,2</sup>, Min-Hyeok Yang<sup>1,2</sup>, Bum-Soon Park<sup>1,2</sup>, Jeong-Han Lee<sup>1</sup>, Jae-Cheol Park<sup>1</sup>, and Hyun-Kuk Park<sup>1</sup>

(<sup>1</sup>KITECH, <sup>2</sup>Chonnam National University)

TS04T\_P\_8

**Thermal and Mechanical Property of Cu-Ti Composites as a Function of Ti Content by a Spark Plasma Sintering and Rolling Process**

Min hyeok Yang<sup>1,2</sup>, Bum soon Park<sup>1,2</sup>, Yu gyun Park<sup>1,2</sup>, Jeong han Lee<sup>1</sup>, Jae cheol Park<sup>1</sup>, and Hyun kuk Park<sup>1</sup>

(<sup>1</sup>KITECH, <sup>2</sup>Chonnam National University)

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# Technical Sessions

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## **[TS05] Nanomaterials for Extreme Environments and Applications**

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### **Theme: Nanotechnology for Materials to Explore Untamed Areas of Humanity**

With the advancement of industrial society, the living environment for humanity, including climate change, is gradually becoming harsher. Besides, exploration of uncharted territories by humanity is becoming an essential part for the sustainability of humanity. In this session, we aim to share and discuss the latest research findings in nano-materials for ensuring reliability under extreme environments such as ultra-high / low temperatures, very high pressure, severe corrosion, aerospace applications and so on.

## [TS05W1]

### Nanomaterials for Extreme Environments and Applications 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 207
Session Chair(s)	Kyoungdoc Kim (POSTECH)

#### TS05W1\_I\_1 \*Invited 09:00–09:30

##### Microstructural Design of Alloys using 3D Printing

Upadrasta Ramamurty

(Nanyang Technological University)

#### TS05W1\_O\_2 09:30–09:45

##### Additive Manufacturing for Heterogeneous Metallic Architected Materials

Hyoung Seop Kim

(POSTECH)

#### TS05W1\_O\_3 09:45–10:00

##### Mechanical Behavior of Pure Copper Fabricated by Selective Laser Melting at Liquid Helium Temperature

Seong-June Youn, Ka-Ram Lim, Young-Sang Na, and Young-Kyun Kim

(KIMS)

#### TS05W1\_O\_4 10:00–10:15

##### Synergistic Effects of Grain Boundary and Chemical Short-Range Order on Radiation Resistance in NiCoCr Alloys

Hyeonwoo Kim<sup>1</sup>, Sangtae Kim<sup>1</sup>, Miaomiao Jin<sup>2</sup>, and Yang Yang<sup>2</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>Pennsylvania State University)

#### TS05W1\_O\_5 10:15–10:30

##### Integrated Computational Materials Engineering for Fire Resistant Steels

Kyoungdoc Kim

(POSTECH)

## [TS05W2]

## Nanomaterials for Extreme Environments and Applications 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:40
Place	Room 207
Session Chair(s)	Dong-Woo Suh (POSTECH)

## TS05W2\_I\_1 \*Invited 15:40–16:10

## Recent Nanoindentation Studies on Novel Materials R&amp;D

Jae-il Jang

*(Hanyang University)*

## TS05W2\_I\_2 \*Invited 16:10–16:40

## Design of Bulk Nanostructured Eutectic High Entropy Alloy and its Application for Electrocatalysis

Zhijun Wang, Xiao Han, Qingfeng Wu, Xiaobin Hu, Runtong Zhou, Qiao Chen, Xueyuan Qiu, Pan Wang, Chang Guo, and Jincheng Wang

*(Northwestern Polytechnical University)*

## TS05W2\_O\_3 16:40–16:55

## Microstructure Evolution of Hierarchical Nanotwins in CoCrFeNi High-Entropy Alloys as Function of High Strain-Rate Hopkinson Bar Deformations

Tsai-Fu Chung<sup>1,2</sup>, Chien-Nan Hsiao<sup>3</sup>, Po-Kai Chiu<sup>3</sup>, Yo-Shiuan Lin<sup>4</sup>, Jer-Ren Yang<sup>4</sup>, An-Chou Yeh<sup>2</sup>, Jien-Wei Yeh<sup>2</sup>, and Chih-Yuan Chen<sup>5</sup>*(<sup>1</sup>National Yang Ming Chiao Tung University, <sup>2</sup>National Tsing Hua University, <sup>3</sup>Taiwan Instrument Research Institute, <sup>4</sup>National Taiwan University, <sup>5</sup>National Taipei University of Technology)*

## TS05W2\_O\_5 16:55–17:10

## Boron Microalloying for Nano-Precipitation-Strengthened High-Temperature Eutectic High-Entropy All

Yuhao Jia, Zhijun Wang, and Qingfeng Wu

*(Northwestern Polytechnical University)*

## TS05W2\_O\_6 17:10–17:25

## Exploring Corrosion Behavior of Al–Si–Mg Alloys: Role of Intermetallic Phases

Saif Haider Kayani, Young-Hee Cho, Heon-Young Ha, and Jung-Moo Lee

*(KIMS)*

TS05W2\_O\_7

17:25–17:40

**The Effect of an Atomic Hydrogen on the Kink Formation in a  $\langle 111 \rangle \{110\}$  Screw Dislocation in BCC Tungsten: Atomistic Study**

Hyoungryl Park, Hyung Gyu Lee, and Keonwook Kang

*(Yonsei University)*

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**[TS05T3]****Nanomaterials for Extreme Environments and Applications 3**

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 09:00–10:30
<b>Place</b>	Room 207
<b>Session Chair(s)</b>	Seok-Woo Lee (Univ. of Connecticut)

<b>TS05T3_I_1</b>	<b>*Invited</b>	<b>09:00–09:30</b>
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**Liquid Metal Dealloying: A New Metallurgical Method Utilizing Unmixing Properties**

Hidemi Kato

*(Tohoku University)*

<b>TS05T3_I_2</b>	<b>*Invited</b>	<b>09:30–10:00</b>
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**Thermoplastic Forming of Zr-Based Metallic Glasses including Gas Pressure Molding and Nanoimprinting Lithography**Young-Sang Na<sup>1</sup>, Sang-Tae Woo<sup>1,2</sup>, Ka-Ram Lim<sup>1</sup>, and Young-Kyun Kim<sup>1</sup>*(<sup>1</sup>KIMS, <sup>2</sup>Pusan National University)*

<b>TS05T3_O_3</b>	<b>10:00–10:15</b>
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**Influence of Joining Conditions on the Strength of Fe–Mg Joints Achieved by Dealloying Reaction**

Kota Kurabayashi, Takeshi Wada, and Hidemi Kato

*(Tohoku University)*

<b>TS05T3_O_4</b>	<b>10:15–10:30</b>
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**Amorphization of Si–Ge by Non-Equilibrium Eutectic Reaction in a Liquid Quenched Al–Si–Ge Alloy**

Rui Yamada, Yuta Konno, Junpei. T. Okada, Takeshi Wada, and Hidemi Kato

*(Tohoku University)*

## [TS05T4]

### Nanomaterials for Extreme Environments and Applications 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 207
Session Chair(s)	Youngsang Na (KIMS)

#### TS05T4\_I\_1 \*Invited 14:00–14:30

##### Micro-Tensile Behavior of Body-Centered-Cubic Metal Single Crystals at Cryogenic Temperatures

Seok-Woo Lee

(University of Connecticut)

#### TS05T4\_I\_2 \*Invited 14:30–15:00

##### Enhancing Mechanical and Functional Properties using Severe Plastic Deformation under High-Pressure

Zenji Horita<sup>1,2,3</sup>

(<sup>1</sup>Kyushu Institute of Technology, <sup>2</sup>Kumamoto University, <sup>3</sup>Saga University)

#### TS05T4\_O\_3 15:00–15:15

##### Understanding the Tensile Behaviors and Discontinuous Plastic Flow of 304L Stainless Steel at Liquid-Helium Temperature

Sang-Hun Shim, Seungmin Jeon, Seong-June Youn, Junho Lee, Ka-Ram Lim, Young-Kyun Kim, and Young-Sang Na

(KIMS)

#### TS05T4\_O\_4 15:15–15:30

##### Strain-Rate-Dependent Dislocation Plasticity in Mg Alloys

X.Y. Xu<sup>1</sup>, C.P. Huang<sup>1</sup>, H.Y. Wang<sup>2</sup>, Y.Z. Li<sup>3</sup>, and M.X. Huang<sup>1</sup>

(<sup>1</sup>The University of Hong Kong, <sup>2</sup>Hebei University of Technology, <sup>3</sup>Northeastern University)

## [TS05T5]

## Nanomaterials for Extreme Environments and Applications 5

Date & Time	July 4(Thu.), 2024 / 15:40–17:55
Place	Room 207
Session Chair(s)	Jae Bok Seol (Gyeongsang Nat'l Univ.)

## TS05T5\_I\_1 \*Invited 15:40–16:10

## Atomic-Scale Observation of Twinning-Induced Phase Transformation in Ni-Based Superalloys

Jae Bok Seol

*(Gyeongsang National University)*

## TS05T5\_I\_2 \*Invited 16:10–16:40

## Formation of Disordered Nano Particles and their Influence on the Elevated Temperature Deformation of High Entropy Superalloys

Wei-Che Hsu<sup>1</sup>, Jhuo-Lun Lee<sup>1</sup>, Tso-Wei Chen<sup>1</sup>, Mainak Saha<sup>2</sup>, Takuma Saito<sup>2,3,4</sup>, Taisuke Sakaki<sup>2</sup>, Hideyuki Murakami<sup>2,4</sup>, You-Yi Lin<sup>5</sup>, You-Lun Hsu<sup>5</sup>, Tasi-Fu Chung<sup>5</sup>, Nien-Ti Tsou<sup>5</sup>, Ching-Yu Chiang<sup>6</sup>, and An-Chou Yeh<sup>1</sup>*(<sup>1</sup>National Tsing Hua University, <sup>2</sup>NIMS, <sup>3</sup>Ruhr University Bochum, <sup>4</sup>Waseda University, <sup>5</sup>National Yang Ming Chiao Tung University, <sup>6</sup>National Synchrotron Radiation Research Center)*

## TS05T5\_O\_3 16:40–16:55

## Current Status of Development of Korean Reduced Ferritic/Martensitic Steel with Small Amounts of Ta and Ti

Chang-Hoon Lee<sup>1</sup>, Joonoh Moon<sup>2</sup>, Hyun-Uk Hong<sup>2</sup>, Chansun Shin<sup>3</sup>, and Hyoung Chan Kim<sup>4</sup>*(<sup>1</sup>KIMS, <sup>2</sup>Pusan National University, <sup>2</sup>Changwon National University, <sup>3</sup>Myongji University, <sup>4</sup>Korean Institute of Fusion Energy)*

## TS05T5\_O\_4 16:55–17:10

## Utilization of Nano-Sized Precipitates to Enhance the Creep and Radiation Resistance of Austenitic Stainless Steels for Advanced Nuclear Systems

Changheui Jang<sup>1</sup>, Hyun Joon Eom<sup>1</sup>, Ji Ho Shin<sup>2</sup>, and Gokul Obulan Subramanian<sup>3</sup>*(<sup>1</sup>KAIST, <sup>2</sup>Korea Hydro and Nuclear Power Co., Ltd., <sup>3</sup>University of Michigan)*

TS05T5\_O\_5

17:10–17:25

**Investigating Weldability of Material Combinations for Supersonic High Pressure Vaporising Foil Actuator Welding through Meso-Scale and Nano Scale Computational Framework and Experimental Characterisation**

Deepak Kumar and Taeseon Lee  
(*Incheon National University*)

TS05T5\_O\_6

17:25–17:40

**Effect of Electron Temperature Model on Collision Cascades upon Neutron Irradiation through Molecular Dynamics Simulation**

Youngguk Shin<sup>1</sup>, Keonwook Kang<sup>2</sup>, and Byeongchan Lee<sup>1</sup>  
(<sup>1</sup>*Kyung Hee University*, <sup>2</sup>*Yonsei University*)

TS05T5\_O\_7

17:40–17:55

**The Evolution of Microstructures in  $\text{Al}_{0.2}\text{Co}_{1.5}\text{CrFeNi}_{1.5}\text{Ti}_{0.3}$  High Entropy Alloy through Extreme Environmental Temperatures**

Che-Wei Tsai<sup>1</sup>, Ting-En Shen<sup>1</sup>, Jun-Jie Yang<sup>1</sup>, Hung-Chih Liu<sup>1</sup>, and Hung-Wei Yen<sup>1,2</sup>  
(<sup>1</sup>*National Tsing Hua University*, <sup>2</sup>*National Taiwan University*)

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## [TS05F6]

### Nanomaterials for Extreme Environments and Applications 6

Date & Time	July 5(Fri.), 2024 / 09:00–09:45
Place	Room 207
Session Chair(s)	Hyoung Seop Kim (POSTECH)

#### TS05F6\_O\_1

09:00–09:15

##### Bio-Mimetic Tactile Sensing and Material Identification with Triboelectric driven Synaptic Organic Electrochemical Transistor

M Junaid Sultan, Atanu Bag, Seok Ju Hong, and Nae-Eung Lee  
*(Sungkyunkwan University)*

#### TS05F6\_O\_2

09:15–09:30

##### Multifunctional MXene/Carbon Nanotube Janus Film for Electromagnetic Shielding and Infrared Shielding/Detection in Harsh Environments

Tufail Hassan<sup>1</sup>, Nilufer Cakmakci<sup>2</sup>, Youngjin Jeong<sup>2</sup>, and Chong Min Koo<sup>1</sup>  
*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Soongsil University)*

#### TS05F6\_O\_4

09:30–09:45

##### Mass Transport Phenomena in Low-Dimensional Space

Heechan Yang and Hyung Gyu Park  
*(POSTECH)*

## [TS05] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS05W\_BP\_1

#### Space Environment Effect on Electrical Reliability to a-IGZO Thin-Film Transistors Caused by Proton Bombardment

Junho Noh and Byoungdeog Choi  
(*Sungkyunkwan University*)

### TS05W\_BP\_2

#### Micro-Alloying as a Solution for Mitigating Hydrogen Embrittlement in Ultra High Strength Press Hardening Steel (PHS)

Seokhwan Ju<sup>1</sup>, Ho Hyeong Lee<sup>1</sup>, Seawoong Lee<sup>2</sup>, and Dong-Woo Suh<sup>1</sup>  
(<sup>1</sup>POSTECH, <sup>2</sup>POSCO)

### TS05W\_BP\_3

#### Periodic Spinodal Decomposition in Double-Strengthened Medium-Entropy Alloy

Hyojin Park<sup>1</sup>, Farahnaz Haftlang<sup>1,2</sup>, Yoon-Uk Heo<sup>1</sup>, Jae Bok Seol<sup>3</sup>, Zhijun Wang<sup>4</sup>, and Hyoung Seop Kim<sup>1</sup>  
(<sup>1</sup>POSETCH, <sup>2</sup>Northwestern University, <sup>3</sup>Gyeongsang National University, <sup>4</sup>Northwestern Polytechnical University)

### TS05W\_BP\_4

#### Grain Boundary Embrittlement in Age Hardenable Fe-Ni-X Alloys

Dong-Hyun Kim and Yoon-Uk Heo  
(POSTECH)

### TS05W\_BP\_5

#### Hydrogen Absorption during Austenitization in Al-Based Intermetallic Coated 31MnB5 Steel

Seong-Min Ko<sup>1</sup>, Seon-Keun Oh<sup>1</sup>, Nu-Ri Cho<sup>1</sup>, Changhun Kim<sup>2</sup>, Donghwa Lee<sup>2</sup>, Seongwoo Kim<sup>3</sup>, Jinkeun Oh<sup>3</sup>, and Young-Kook Lee<sup>1,2</sup>  
(<sup>1</sup>Yonsei University, <sup>2</sup>POSTECH, <sup>3</sup>POSCO)

### TS05W\_BP\_6

#### Bader Charge Analysis of Oxygen Content Impact on the Lattice Structure of Additively Manufactured TiZrNb Alloys

Aamir Malik<sup>1</sup>, Muhammad Akmal<sup>2</sup>, and Ho Jin Ryu<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>KIMS)

**TS05W\_BP\_7****The Effect of Rhenium Addition on the Mechanical Properties and Microstructures of Ni-16Mo ODS Alloys for Nuclear Applications**Deasik Kim<sup>1</sup>, Jaeyoon Bae<sup>1</sup>, Kunok Chang<sup>2</sup>, Young-Sang Youn<sup>3</sup>, and Sanghoon Noh<sup>1</sup>*(<sup>1</sup>Pukyong National University, <sup>2</sup>Kyung Hee University, <sup>3</sup>Yeungnam University)***TS05W\_BP\_8****Hydrogen Absorption and Embrittlement of Martensitic Medium-Mn Steels**Ahjeong Lyu<sup>1</sup>, Junghoon Lee<sup>1,2</sup>, Jae-Hoon Nam<sup>1,3</sup>, Minjeong Kim<sup>1</sup>, and Young-Kook Lee<sup>1,4</sup>*(<sup>1</sup>Yonsei University, <sup>2</sup>RIST, <sup>3</sup>Samsung Electronics Co., Ltd., <sup>4</sup>POSTECH)***TS05W\_BP\_9****A Nanoindentation Study on the Micromechanical Behavior of Multi Layered Medium-Entropy Alloy**Zhe Gao<sup>1</sup>, Dong-Hyun Lee<sup>2</sup>, Yakai Zhao<sup>3</sup>, Hyoung Seop Kim<sup>4</sup>, Upadrasta Ramamurty<sup>5</sup>, and Jae-il Jang<sup>1</sup>*(<sup>1</sup>Hanyang University, <sup>2</sup>Chungnam National University, <sup>3</sup>Institute of Materials Research Engineering, <sup>4</sup>POSTECH, <sup>5</sup>Nanyang Technological University)***TS05W\_BP\_10****High Temperature Oxidation Behavior of C-Doped CoCrNi Medium Entropy Alloy Fabricated by Laser Powder Bed Fusion**

Soobin Kim, So-Yeon Park, and Kee-Ahn Lee

*(Inha University)***TS05W\_BP\_11****Evaluation of Mechanical Property of Thermally Aged Austenitic Stainless Steel Weld for Reactor Vessel Internal in Nuclear Power Plants**Seokmin Hong<sup>1</sup>, Yoojin Kim<sup>1,2</sup>, Se-Mi Hyun<sup>1,3</sup>, Hyung-Ha Jin<sup>1</sup>, Min-Chul Kim<sup>1</sup>, and Jongmin Kim<sup>1</sup>*(<sup>1</sup>KAERI, <sup>2</sup>Chungnam National University, <sup>3</sup>Korea University)***TS05W\_BP\_12****High-Temperature Resistance of Modified A357 Alloy for Aerospace Applications**Hyunyoung Park<sup>1</sup>, Seoyeon Jeon<sup>1</sup>, Boram Lee<sup>1</sup>, Jonguk Hwang<sup>2</sup>, Suwon Park<sup>1</sup>, and Hyunjoon Choi<sup>1</sup>*(<sup>1</sup>Kookmin University, <sup>2</sup>Eloi Materials Lab Co., Ltd.)***TS05W\_BP\_13****The Influence of Mechanical Alloying on the Microstructure and Mechanical Properties of Nickel-Based ODS (Oxide Dispersion Strengthened) Alloys**

Jaeyoon Bae, Jungmin Lee, and Sanghoon Noh

*(Pukyong National University)*

### TS05W\_BP\_14

#### Multiscale Characterization from Micrometer down to Atomic Regime for Mechanistic Understanding of STS 316L upon Deformation at 4.2 K

Muhammad Ishtiaq<sup>1</sup>, Young-Kyun Kim<sup>2</sup>, Saurabh Tiwari<sup>1</sup>, Ka-Ram Lim<sup>2</sup>, Young-Sang Na<sup>2</sup>, and Jae-Bok Seol<sup>1</sup>  
(<sup>1</sup>Gyeongsang National University, <sup>2</sup>KIMS)

### TS05W\_BP\_15

#### Promising Elevated Temperature Mechanical Properties of Novel Nano and Ultrafine-Grained Fe<sub>47</sub>Mn<sub>25</sub>Al<sub>13</sub>Cr<sub>7</sub>Ni<sub>5</sub>C<sub>3</sub> Medium-Entropy Alloy

Gang Hee Gu, Jae Heung Lee, Hyeonseok Kwon, and Hyoung Seop Kim  
(POSTECH)

### TS05W\_BP\_16

#### Effect of PWHT Conditions on Mechanical Properties of TIG Welded Reduced Activation Ferritic/Martensitic Steels

MD Asraful Islam Ashik, Sejin Kim, and Sanghoon Noh  
(Pukyong National University)

### TS05W\_BP\_17

#### Hydrogen Storage Properties and Microstructural Evolution of Ti-Fe-C Alloys

Kyubin Hwang<sup>1,2</sup>, Jinyoung You<sup>2</sup>, Yunseok Kim<sup>1,2</sup>, Young-Su Lee<sup>1</sup>, and Jae-Hyeok Shim<sup>1,2</sup>  
(<sup>1</sup>KIST, <sup>2</sup>Sungkyunkwan University)

### TS05W\_BP\_18

#### Comparison of Dynamic Tensile Extrusion Behavior of Pure Cu Fabricated by Equal Channel Angular Pressing and Powder Injection Molding

Keunho Lee<sup>1</sup>, Seok Bong Kim<sup>1</sup>, Leeju Park<sup>1</sup>, and Kyung-Tae Park<sup>2</sup>  
(<sup>1</sup>ADD, <sup>2</sup>Hanbat National University)

### TS05W\_BP\_19

#### Regulation of Cryogenic Mechanical Behaviors of C-Added Non-Equiatomic CoCrFeNiMo Ferrous Medium-Entropy Alloy via Control of Initial Microstructure

Ji Yeong Lee<sup>1</sup>, Hyeonseok Kwon<sup>1</sup>, and Hyeong Seop Kim<sup>1,2,3</sup>  
(<sup>1</sup>POSTECH, <sup>2</sup>Tohoku University, <sup>3</sup>Yonsei University)

### TS05W\_BP\_20

#### Superior Tensile Properties and Formability Synergy of High-Entropy Alloys through Inverse-Gradient Structures

Rae Eon Kim, Gang Hee Gu, Yeon Taek Choi, Jeong Ah Lee, and Hyoung Seop Kim  
(POSTECH)

**TS05W\_BP\_21**

**Effects of V Addition on Hydrogen Storage Properties of Ti-Fe-Ce Alloys**

Si-Won Jin<sup>1,2</sup>, Young-Kook Lee<sup>2</sup>, and Jae-Hyeok Shim<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Yonsei University)

**TS05W\_BP\_22**

**Effects of Sub-Micron Cell Size Variation on Mechanical Properties of High Entropy Alloy Fabricated via Laser Powder Bed Fusion**

Meng-Yun Lee<sup>1,2</sup>, Hyojin Park<sup>1</sup>, Chung-En Cheng<sup>2</sup>, Pie-Keng Shen<sup>2</sup>, Che-Wei Tsai<sup>2</sup>, An Chou Yeh<sup>2</sup>, and Hyoung Seop Kim<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>National Tsing Hua University)

**TS05W\_BP\_23**

**Influence of Top-of-Tubesheet Denting on General Corrosion Behavior of Steam Generator Tube in PWR Secondary System**

Ji-Young Han<sup>1,2</sup>, Hee-Sang Shim<sup>1</sup>, Sung-Woo Kim<sup>1</sup>, and Soon-Hyeok Jeon<sup>1</sup>

(<sup>1</sup>KAERI, <sup>2</sup>Yonsei University)

**TS05W\_BP\_24**

**Investigating the Preparation of Refractory High Entropy Alloy via Optical Floating Zone Crystal Growth Processing**

Hung Yen<sup>1</sup>, Che-Jen Liu<sup>1</sup>, An-Chou Yeh<sup>1</sup>, and Hyeong-Seop Kim<sup>2</sup>

(<sup>1</sup>National Tsing Hua University, <sup>2</sup>POSTECH)

**TS05W\_BP\_25**

**Deformation Mechanism of a Partially Recrystallized Metastable Medium Entropy Alloy**

Jae Heung Lee<sup>1</sup>, Hyeonseok Kwon<sup>1</sup>, Gang Hee Gu<sup>1</sup>, Ji Yeong Lee<sup>1</sup>, Sang Guk Jeong<sup>1</sup>, Emad Maawad<sup>2</sup>, Changwan Ha<sup>3</sup>, Sangbong Yi<sup>4</sup>, and Hyoung Seop Kim<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>Helmholtz-Zentrum Hereon, <sup>3</sup>Pohang Accelerator Laboratory, <sup>4</sup>Kumho National Institute of Technology)

**TS05W\_BP\_26**

**Evaluation of L-DED Additively Manufactured 316L Stainless Steel Valve**

Suk Hoon Kang, Seungmun Jung, Young-Bum Chun, and Chang-Kyu Rhee

(KAERI)

## [TS05] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS05T\_BP\_1

#### Enhanced Cryogenic Tensile Properties of Additive Manufacturing STS316L Steel using Nano-Oxide Dispersion of Reusable Powder

Cho Hyeon Lee<sup>1</sup>, Won Hui Jo<sup>1</sup>, Tiwari Saurabh<sup>1</sup>, Jung Gi Kim<sup>1</sup>, Hyoung Seop Kim<sup>2</sup>, and Jae Bok Seol<sup>1</sup>  
(<sup>1</sup>Gyeongsang National University, <sup>2</sup>POSTECH)

### TS05T\_BP\_2

#### Influence of Direct Energy Deposition Manufacturing Parameters on the Printability, Microstructure, and Mechanical Properties of Medium-Mn Steels

Won Hui Jo<sup>1</sup>, Cho Hyeon Lee<sup>1</sup>, Tiwari Saurabh<sup>1</sup>, In Seon Kim<sup>2</sup>, Hyun Joong Kim<sup>2</sup>, Sung Jae Jo<sup>2</sup>, Jung Gi Kim<sup>1</sup>, Hyokyung Sung<sup>3</sup>, Soon Jik Hong<sup>2</sup>, and Jae Bok Seol<sup>1</sup>  
(<sup>1</sup>Gyeongsang National University, <sup>2</sup>Kongju National University, <sup>3</sup>Kookmin University)

### TS05T\_BP\_3

#### Controlling Heterogeneity of Ni Based Super Alloy and Austenitic Steel Interface by Functionally Gradient Method using Gas Atmosphere Alteration

Seong Gyu Chung, Seung Hoon Lee, Omer Cakmak, Hwasung Yeom, and Jung Wook Cho  
(POSTECH)

### TS05T\_BP\_4

#### Fabrication of Ti-Zr-Nb Based Composite Part using Laser Powder Directed Energy Deposition

Wonjong Jeong and Hojin Ryu  
(KAIST)

### TS05T\_BP\_5

#### Microstructure and Mechanical Properties of ECAP Processed High Mn Steel under Different Temperature

Young Hoon Jung<sup>1</sup>, Beom Joon Kim<sup>1</sup>, Hyeonseok Kwon<sup>2</sup>, M. Abramova<sup>3</sup>, Hyoung Seop Kim<sup>2</sup>, N. Enikeev<sup>3,4</sup>, and Jung Gi Kim<sup>1</sup>  
(<sup>1</sup>Gyeongsang National University, <sup>2</sup>POSTECH, <sup>3</sup>UST, <sup>4</sup>Saint Petersburg State University)

### TS05T\_BP\_6

#### Effect of Heat Treatment Condition on the Mechanical Properties of Laser Powder Bed Fusion-Processed 18Ni300 Maraging Steel

Gun Woo No, Jonghyun Jung, Jae Bok Seol, and Jung Gi Kim  
(Gyeongsang National University)

**TS05T\_BP\_7**

**Correlation between Defects and PBTI, NBTI Stress Instability in Amorphous n- and Polycrystalline p-Type Thin-Film Transistors Plane under Hydrogen Ion irradiation Conditions**

Junho Noh and Byoungdeog Choi

*(Sungkyunkwan University)*

**TS05T\_BP\_8**

**Additive Manufacturing of Nitride and Oxide Dispersion Strengthened Fe12Cr6Al Alloys**

Omer Cakmak and Jung Wook Cho

*(POSTECH)*

**TS05T\_BP\_9**

**Prediction of Evaporation in Multi-Component Melt Pool during Additive Manufacturing Process**

Matae Lee and Byeong-Joo Lee

*(POSTECH)*

**TS05T\_BP\_10**

**Analysis of Microstructure and Ductile-Brittle Transition Behavior of SUS316L Material Manufactured by L-PBF in the Charpy Impact Test**

Tae Hyeong Kim<sup>1</sup>, Jun Seok Lee<sup>1</sup>, Haeum Park<sup>2</sup>, Jeong Min Park<sup>2</sup>, and Jae Wung Bae<sup>1</sup>

*(<sup>1</sup>Pukyong National University, <sup>2</sup>KIMS)*

**TS05T\_BP\_11**

**Development of Bimodal Nanoporous TiZrHfNbTa<sub>2</sub>Ni High-Entropy Alloy using Liquid Metal Dealloying**

Jaehyuk Lee<sup>1</sup>, Soovin Ha<sup>1</sup>, Jihye Seong<sup>1</sup>, Jee Eun Jang<sup>2</sup>, Seong Hyuk Park<sup>2</sup>, Hidemi Kato<sup>3</sup>, and Soo-Hyun Joo<sup>1</sup>

*(<sup>1</sup>Dankook University, <sup>2</sup>Kyungpook National University, <sup>3</sup>Tohoku University)*

**TS05T\_BP\_12**

**Surface Heterostructuring of Laser-Clad 316L Stainless Steel through Texture-Driven Deformation Twinning**

Jeong Min Lee<sup>1</sup>, Rae Eon Kim<sup>2</sup>, Hyoung Seop Kim<sup>2</sup>, and Jongun Moon<sup>1</sup>

*(<sup>1</sup>Kongju National University, <sup>2</sup>POSTECH)*

**TS05T\_BP\_13**

**Development of 3D Interconnected Heterogeneous High-Entropy Alloys via Liquid Metal Dealloying with CoCrFeMnNi Precursor and Pure Cu Melt**

MunSu Choi<sup>1</sup>, GangHee Gu<sup>2</sup>, YongSeok Choi<sup>1</sup>, JongUn Moon<sup>3</sup>, SeungJeon Han<sup>4</sup>, HyoungSeop Kim<sup>2</sup>, Hidemi Kato<sup>5</sup>, and SooHyun Joo<sup>1</sup>

*(<sup>1</sup>Dankook University, <sup>2</sup>POSTECH, <sup>3</sup>Kongju National University, <sup>4</sup>KIMS, <sup>5</sup>Tohoku University)*

### TS05T\_BP\_14

#### Ultra-Low Temperature Tensile Behavior of Additively Manufactured 316L Stainless Steel

Haeum Park<sup>1,2</sup>, Heechan Jung<sup>2</sup>, Min Young Sung<sup>2</sup>, Young-Kyun Kim<sup>1</sup>, Kyung Tae Kim<sup>1</sup>, Jeong Min Park<sup>1</sup>, and Seok Su Sohn<sup>2</sup>

(<sup>1</sup>KIMS, <sup>2</sup>Korea University)

### TS05T\_BP\_15

#### Comparative Study on Nanoparticle-Added Composites as Sacrificial Thermal Protective Materials

Junyoung Lee and Sanghyuk Yum

(KOREATECH)

### TS05T\_BP\_16

#### Optimized Post-Processing of High Performance Doped Reduced Graphene Oxide Reinforced Magnesium-Based Matrix Nanocomposites

Adinda Rosadi, Tae Yeong Kong, Cheolhyeon Lee, and Ho Jin Ryu

(KAIST)

### TS05T\_BP\_17

#### The Effect of Surface Modification for Improved Stability of Ni-Rich NCM Cathodes in Air and Moisture

Seunghyoen Lee, Changdae Im, Jongyeop Choi, and Seunghoon Nam

(Myongji University)

### TS05T\_BP\_18

#### The Role of Intercritical Annealing Temperature on Tensile Properties and Impact Toughness in an Fe-Mn-Si-C-Based TRIP-Assisted Steels

Chang-Gon Jeong<sup>1</sup>, T.T.T. Trang<sup>1</sup>, Young Yoon Woo<sup>2</sup>, Eun Yoo Yoon<sup>2</sup>, Youngseon Lee<sup>2</sup>, and Yoon-Uk Heo<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>KIMS)

### TS05T\_BP\_19

#### Effect of Chemically Heterogeneous Microstructure on Hydrogen Embrittlement in Martensitic Steel

Ho Hyeong Lee<sup>1</sup>, Ki-Taek Jung<sup>2</sup>, and Dong-Woo Suh<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>POSCO)

### TS05T\_BP\_20

#### The Impact of Initial Microstructure on the Yield Strength in Nb-Ti Added Cold-Rolled Steel

Seok-Hwan Hong<sup>1</sup>, Ji Hoon Kim<sup>2</sup>, and Dong-Woo Suh<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>Tohoku University)

### TS05T\_BP\_21

#### Additive Manufacturing of Aluminum Alloy by Addition of Micro-Reinforcement Particles

Hyeongseob Kim, Wonjong Jeong, and Hojin Ryu

(KAIST)



TS05T\_BP\_22

**Development of Co-Free High Entropy Alloys Strengthened by Coherent L1<sub>2</sub> Precipitates Showing Suppressed Mechanical Instability at Cryogenic Temperatures**

Jun Seok Lee, Tae Hyeong Kim, and Jae Wung Bae

*(Pukyong National University)*

NANO  
KOREA  
2024  
Symposium

## [TS05] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS05T\_P\_1

#### Strengthening the Additively Manufactured NiCoCrC Medium Entropy Alloy through Controlling Nano-Sized Precipitation and Sub-Cell Structure

So-Yeon Park<sup>1</sup>, Soo-Bin Kim<sup>1</sup>, Ji-Eun Ahn<sup>1</sup>, Young-Kyun Kim<sup>1,2</sup>, and Kee-Ahn Lee<sup>1</sup>

(<sup>1</sup>Inha University, <sup>2</sup>KIMS)

### TS05T\_P\_2

#### High Temperature Corrosion Behavior of Pure Nickel in NaCl-MgCl<sub>2</sub> Molten Salt at 600 °C

Lee Won Chan<sup>1</sup>, Nam Seung Ju<sup>1</sup>, Ko Uijun<sup>1</sup>, Park jin woong<sup>1</sup>, Hwang Seong Sik<sup>2</sup>, Jeon Soon Hyeok<sup>2</sup>, Yoon Jihyun<sup>2</sup>, and Kim Jeoung Han<sup>1</sup>

(<sup>1</sup>Hanbat National University, <sup>2</sup>KAERI)

### TS05T\_P\_3

#### Application of the Radial Distribution Function for Analyzing the Uniformity of Neutron Absorbers

Junhyun Kwon, Sun-Young Park, Hyung-Ha Jin, and Young-Bum Chun

(KAERI)

### TS05T\_P\_4

#### Ti-Gd Alloys with Superior Neutron Absorbing Capability and Structural Function

Do Haeng Hur, Ji-Hoon Kang, and Young-Bum Chun

(KAERI)

### TS05T\_P\_5

#### Cu-B Neutron Absorber with High Thermal Conductivity for Spent Nuclear Fuel Storage Applications

Young-Bum Chun and Ji-Hoon Kang

(KAERI)

### TS05T\_P\_6

#### Removal of Radioactive Elements using Transition Metal Carbide Based Nanomaterials

Changhyun Roh<sup>1,2</sup>, Sion Kim<sup>1,2</sup>, Sujung Min<sup>1</sup>, and Sang Bum Hong<sup>1</sup>

(<sup>1</sup>KAERI, <sup>2</sup>UST)

### TS05T\_P\_7

#### Nano-Scale Co-Precipitation Mechanism in Al-Si-Mg Alloys

Saif Haider Kayani, Sang-Ik Lee, Yoon-Ho Lee, Jung-Moo Lee, Kwangjun Euh, and Young Hee Cho

(KIMS)

## [TS05] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS05F\_P\_1

#### Comparison of High-Temperature Properties of Additive Manufactured and Cast Al-Zn-Mg-Cu-Si Alloys

Jiwon Park<sup>1</sup>, Seoyeon Jeon<sup>1</sup>, Boram Lee<sup>1</sup>, Jonguk Hwang<sup>2</sup>, Suwon Park<sup>1</sup>, and Hyunjoon Choi<sup>1</sup>

(<sup>1</sup>Kookmin University, <sup>2</sup>Eloi Materials Lab Co., Ltd.)

### TS05F\_P\_2

#### Strong yet Strain-Hardenable Equiatomic CoCrFeMnNi High-Entropy Alloys by Dynamic Heterostructuring

Jungwan Lee<sup>1</sup>, Hyojin Park<sup>1</sup>, Sujung Son<sup>1</sup>, and Hyoung-Seop Kim<sup>1,2,3</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>Yonsei University, <sup>3</sup>Tohoku University)

### TS05F\_P\_3

#### Degradation Behavior of Ti-Based High-Entropy Alloys Prepared by Direct Energy Deposition

Juho Kim, Taeyoel Kim, Hwajin Park, Kyeongjin Kim, Seoyeon Jeon, Hyokyung Sung, and Hyunjoon Choi

(Kookmin University)

### TS05F\_P\_4

#### The Influence of Cobalt and Copper on the Austenite Grain Growth Behavior in 9-12Cr Heat Resistant Steel

Bong Cheon Park<sup>1,3</sup>, Sung-Dae Kim<sup>2</sup>, Gun-Young Yoon<sup>1</sup>, Ihho Park<sup>1</sup>, Jae Hoon Jang<sup>1</sup>, and Namhyun Kang<sup>3</sup>

(<sup>1</sup>KIMS, <sup>2</sup>Pukyong National University, <sup>3</sup>Pusan National University)

### TS05F\_P\_5

#### Microstructural Evolution of Mg-xY-Cu-Ni Alloys under Electropulsing Treatment

Seung Yeop Lee<sup>1</sup>, Jinyeong Yu<sup>1</sup>, Seho Cheon<sup>1</sup>, Seong Ho Lee<sup>1</sup>, Dong June Park<sup>1</sup>, Jong Han Song<sup>1</sup>, Jeonghoon Lee<sup>1</sup>, Jonghyun Kim<sup>2</sup>, and Taekyung Lee<sup>1</sup>

(<sup>1</sup>Pusan National University, <sup>2</sup>Chongqing University)

### TS05F\_P\_6

#### High-Temperature Formability Analysis of S355NL for Large Offshore Wind Turbines

Dong June Park<sup>1</sup>, Jinyeong Yu<sup>1</sup>, Seho Cheon<sup>1</sup>, Seong Ho Lee<sup>1</sup>, Jong Han Song<sup>1</sup>, Chae Hun Lee<sup>2</sup>, Jinmo Lee<sup>2</sup>, and Taekyung Lee<sup>1</sup>

(<sup>1</sup>Pusan National University, <sup>2</sup>TAEWOONG Co., Ltd.)

### TS05F\_P\_7

#### Plastic Anisotropy Prediction of Rolled AZ31 using GAN-Aided Machine Learning

Jeonghoon Lee, Jinyeong Yu, Seho Cheon, Seong Ho Lee, Jong Han Song, Dong June Park, Seung Yeop Lee, and Taekyung Lee

*(Pusan National University)*

### TS05F\_P\_8

#### Understanding the Synergistic Co-Mo Effect in Maraging Steels: Redistribution of Solute Atoms

Jong-Kwan Lee and Byeong-Joo Lee

*(POSTECH)*

### TS05F\_P\_9

#### Effect of Trap Densities to Bias Stress Stability in Amorphous Indium Gallium Zinc Oxide Thin Film Transistors

Sungsoo Park and Byoungdeog Choi

*(Sungkyunkwan University)*

### TS05F\_P\_10

#### Ultrastrong and Ductile High-Entropy Alloy with Minimal Serration at Extremely Low Temperature via Coherent Nanoprecipitate

Tae Jin Jang<sup>1</sup>, Gunjick Lee<sup>1</sup>, Sang Yoon Song<sup>1</sup>, Min Young Sung<sup>1</sup>, Jun Ho Lee<sup>2</sup>, Young-Kyun Kim<sup>2</sup>, Hyokyung Sung<sup>3</sup>, Aparna Saksena<sup>4</sup>, Baptiste Gault<sup>4,5</sup>, Se-Ho Kim<sup>1,4</sup>, Alireza Zargarani<sup>6</sup>, Young-Sang Na<sup>2</sup>, and Seok Su Sohn<sup>1</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIMS, <sup>3</sup>Koomin University, <sup>4</sup>Max-Planck-Institut für Eisenforschung GmbH, <sup>5</sup>Imperial College London, <sup>6</sup>POSTECH)*

### TS05F\_P\_12

#### Comparison of Flowability and Characteristics of Inconel 625, Ti-6Al-4V, and SUS316L Powders Used in the DED Process

HyunJoong Kim, Sungjae Jo, Geonwoo Baek, Marzieh Ebrahimian, and Soon-Jik Hong

*(Kongju National University)*

### TS05F\_P\_13

#### Bamboo Activated Carbon Pore Modification for CO<sub>2</sub> and C<sub>7</sub>H<sub>8</sub> Adsorption

Sujeong Heo, Wooram Kim, and Young Min Jo

*(Kyung Hee University)*

### TS05F\_P\_14

#### Effects of Alloying Elements in (Ti<sub>47.5</sub>X<sub>2.5</sub>)Cu<sub>50</sub> Precursor Alloys on the Microstructure of Mg-Ti Composites Synthesized by Liquid Metal Dealloying

Jihye Seong<sup>1</sup>, Jee Eun Jang<sup>2</sup>, Hidemi Kato<sup>3</sup>, Sung Hyuk Park<sup>2</sup>, and Soo-Hyun Joo<sup>1</sup>

*(<sup>1</sup>Dankook University, <sup>2</sup>Kyungpook National University, <sup>3</sup>Tohoku University)*

**TS05F\_P\_15**

**Effects of Initial Microstructures on Reverse Transformation in 10Cr Ferrite/Martensite Heat-Resistant Steel**

Young-Uk Wi<sup>1</sup>, Seok-Hwan Ju<sup>1</sup>, Seong Hoon Kim<sup>2</sup>, Jong Ho Shin<sup>3</sup>, and Dong-Woo Suh<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>KIMS, <sup>3</sup>Doosan Enerbility)

**TS05F\_P\_16**

**Effect of Al on Formability and Tensile Properties of High Al-Containing Ni-Base Alloys as Structural Materials for Molten Salt Reactors**

Chaewon Kim, Hyeon-Geun Lee, Ji-Hyun Yoon, Byung-Hyuk Jun, and Daejong Kim

(KAERI)

**TS05F\_P\_17**

**Effect of Microstructure on Molten Chloride Salt Resistance and High Temperature Mechanical Properties of Ni-Cr-Mo Alloys**

Hyeon-Geun Lee, Chaewon Kim, Jung-Min Kim, and Daejong Kim

(KAERI)

**TS05F\_P\_18**

**Influence of Si Contents on the Microstructure and Tensile Properties of Quenching and Partitioning (Q&P) Processed Low-Alloyed Steels**

Chang Jae Yu<sup>1</sup>, Chang-Hyo Seo<sup>2</sup>, Young-Roc Im<sup>2</sup>, and Dong-Woo Suh<sup>1</sup>

(<sup>1</sup>POSECH, <sup>2</sup>POSCO)

**TS05F\_P\_19**

**Effect of Post-Heat Treatment on Microstructure and Mechanical behavior of 5% Cr Cold Work Tool Steel Manufactured by Direct Energy Deposition**

Jung-Hyun Park<sup>1</sup>, Jin-Young Kim<sup>2</sup>, Hyo-Yun Jung<sup>3</sup>, and Kee-Ahn Lee<sup>1</sup>

(<sup>1</sup>Inha University, <sup>2</sup>Hanwha Aerospace, <sup>3</sup>KITECH)

**TS05F\_P\_20**

**Enhancing Critical Heat Flux with Nano Porous Channel Structures Fabricated via Anodization Technique**

Jung-Woo Kim<sup>1</sup>, Sung Oh Cho<sup>2</sup>, and Young-Bum Chun<sup>1</sup>

(<sup>1</sup>KAERI, <sup>2</sup>KAIST)

**TS05F\_P\_21**

**Mechanical and Thermal Characteristics of Micro-Nano Al/SiC/CNT Hybrid Composites Developed by Nitride Induced Self-Forming Process for Aerospace Applications**

Jiwon Lee, Kanhu Nayak, Juyeon Han, Konbae Lee, and Hyunjoon Choi

(Kookmin University)

**TS05F\_P\_22**

**Development of Sustainable Aluminum Alloys by Incorporating Interstitial Oxygen**

Soomin Kim, Somin Lee, Soomin Lee, Juyeon Han, and Hyunjoo Choi

*(Kookmin University)*

**TS05F\_P\_23**

**Enhancing Energy Absorption and Thermal Battery Protection in Extreme Collision Environments with Honeycomb-Structured Aluminum Buffering Devices**

Yeon Taek Choi<sup>1</sup>, Jihye Kwon<sup>1</sup>, Hyungu Kang<sup>2</sup>, Minu Kim<sup>2</sup>, Ki Jong Kim<sup>3</sup>, Jae Min Lee<sup>4</sup>, Hae-Won Cheong<sup>2</sup>, Sunghak Lee<sup>1</sup>, and Hyoung Seop Kim<sup>1</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>ADD, <sup>3</sup>The One Metal Inc., <sup>4</sup>Hanwha Aerospace)*

**TS05F\_P\_24**

**Effect of Zr and Fe on Tensile Properties of Ti Alloys for Neutron Absorber**

Seungmun Jung and Young-Bum Chun

*(KAERI)*

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# Technical Sessions

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## [TS06] Nanomaterials and Emerging Technologies for Next Generation Sensors

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### **Theme: Nanomaterials, Devices, Systems, and Applications (physical, chemical, optical, bio/healthcare) for Next Generation Sensor Platform**

In order to achieve innovation in future technologies such as sensory humanoid robots and the realization of a complete metaverse, advancements in various sensor technologies are required. This session is dedicated to introducing the cutting-edge trends in research and development of sensor technologies that can be applied to various industries, driving the Fourth Industrial Revolution. The goal is to offer a comprehensive forum for in-depth discussions and scholarly exchange concerning the latest sensor technologies (physical, chemical, optical, bio/healthcare), including novel nanomaterials used in sensing layers, sensor devices, sensor systems, and platforms.

### [TS06W2]

#### Nanomaterials and Emerging Technologies for Next Generation Sensors I

Date & Time	July 3(Wed.), 2024 / 15:40–17:55
Place	Room 208
Session Chair(s)	Seon Joon Kim (KIST)

##### TS06W2\_O\_1 15:40–15:55

###### Development of Artificial Ion Receptors for Point-of-Care Testing

Seon-Jin Choi  
(Hanyang University)

##### TS06W2\_I\_2 \*Invited 15:55–16:25

###### Ultra-Low-Power and High-Performance Electronic Nose by Monolithic MicroLED–Semiconductor Metal Oxide (SMO) Gas Sensors

Inkyu Park<sup>1</sup>, Kichul Lee<sup>1</sup>, and Incheol Cho<sup>2</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>Samsung Electronics Co., Ltd.)

##### TS06W2\_O\_3 16:25–16:40

###### Selective Dual Detection of Hydrogen and Ammonia using Pd–W<sub>18</sub>O<sub>49</sub> Nanowires MEMS Chemoresistive Gas Sensors

Seon Ju Park and Ho Won Jang  
(Seoul National University)

##### TS06W2\_O\_4 16:40–16:55

###### Palladium–Deposited Molybdenum Disulfide–Based Hydrogen Sensor using Machine Learning Technology for Environmental Adaptation

Taeha Kim, U Jin Cho, Youhyeong Jeon, and Min-Woo Kwon  
(Gangneung-Wonju National University)

##### TS06W2\_I\_5 \*Invited 16:55–17:25

###### Understanding Humidity Effects from a Surface Science Point of View – Properties of Adsorbed Water Layer and Sensor Responses

Seong H. Kim  
(Pennsylvania State University)



TS06W2\_O\_6

17:25–17:40

**Functionalization of Single-Atom Catalysts on Conductive Metal–Organic Frameworks for Highly Reversible NO<sub>2</sub> Sensing**

Chungseong Park, Hamin Shin, Mingyu Jeon, and Il-Doo Kim

*(KAIST)*

TS06W2\_O\_7

17:40–17:55

**Robust Chemiresistive Behavior in Conducting Metal–Organic Frameworks Based Composites**

Dong-Ha Kim

*(Hanyang University)*

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### [TS06T3]

#### Nanomaterials and Emerging Technologies for Next Generation Sensors 2

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 208
Session Chair(s)	Kang Hee Ku (UNIST)

##### TS06T3\_O\_1

09:00–09:15

##### Rapid Sensing of Low-Concentration H1N1 Hemagglutinin using Integrated Nanotraps

Seok Cheol Kim, Jong Kwan Park, Aejin Lee, Yun Seo Choi, and Wan Soo Yun

(Sungkyunkwan University)

##### TS06T3\_O\_2

09:15–09:30

##### Additive Effect on Stretchable PEDOT:PSS for Intrinsically Stretchable Photodiodes

Yuanyuan Zhou<sup>1</sup>, Yuto Ochiai<sup>2</sup>, Kaita Takemoto<sup>1</sup>, Minoru Ashizawa<sup>3</sup>, Ting-Wei Chang<sup>4</sup>, Takuji Takahashi<sup>1</sup>, Chien-Chung Shih<sup>4</sup>, and Naoji Matsuhisa<sup>1</sup>

(<sup>1</sup>The University of Tokyo, <sup>2</sup>RIKEN, <sup>3</sup>Tokyo Institute of Technology, <sup>4</sup>National Yunlin University of Science and Technology)

##### TS06T3\_I\_3 \*Invited

09:30–10:00

##### Monolithic Artificial Tactile Neuron for Augmented Synaptic Memory

Do Hwan Kim

(Hanyang University)

##### TS06T3\_O\_4

10:00–10:15

##### Application of Near-Infrared Optical Nanoparticle for Imaging

Sanghwa Jeong

(Pusan National University)

##### TS06T3\_O\_5

10:15–10:30

##### A Strategy for Developing EGaIn-Based Electrochemical Biosensors using Reduced Graphene Oxide Core-Shell Nanoparticles

Dongwook Lee and Jayoung Kim

(Yonsei University)

## [TS06T4]

### Nanomaterials and Emerging Technologies for Next Generation Sensors 3

Date & Time	July 4(Thu.), 2024 / 14:00-15:15
Place	Room 208
Session Chair(s)	Sooyeon Cho (Sungkyunkwan Univ.)

**TS06T4\_I\_1 \*Invited**

14:00-14:30

**Near-Infrared Optical Nanosensors for Plant Stress Monitoring**

Suppanat Puangpathumanond, Huang Biao, and Tedrick Thomas Salim Lew  
*(National University of Singapore)*

**TS06T4\_O\_3**

14:30-14:45

**Wearable Electrochemical Biosensors for Continuous Health Monitoring in Daily-Life**

Jayoung Kim  
*(Yonsei University)*

**TS06T4\_I\_4 \*Invited**

14:45-15:15

**Solution-Processed Van Der Waals Heterostructures for Electronic Sensing Applications**

Joohoon Kang  
*(Sungkyunkwan University)*

### [TS06T5]

#### Nanomaterials and Emerging Technologies for Next Generation Sensors 4

Date & Time	July 4(Thu.), 2024 / 15:40–18:10
Place	Room 208
Session Chair(s)	Sanghwa Jeong (Pusan Nat'l Univ.)

##### TS06T5\_I\_1 \*Invited 15:40–16:10

###### Near Infrared Fluorescent Nanosensors for Biomedical Imaging

Sebastian Kruss<sup>1,2</sup>

(<sup>1</sup>Ruhr University Bochum, <sup>2</sup>Fraunhofer IMS)

##### TS06T5\_O\_2 16:10–16:25

###### Stimuli-Responsive Chiral Biophotonic Composites for Switchable Photonics and Sensors

Saewon Kang<sup>1</sup> and Vladimir V. Tsukruk<sup>2</sup>

(<sup>1</sup>KRICT, <sup>2</sup>Georgia Institute of Technology)

##### TS06T5\_I\_3 \*Invited 16:25–16:55

###### Skin-Conformable Sensors and Displays using Stretchable Polymer Electronic Materials

Naoji Matsuhisa

(The University of Tokyo)

##### TS06T5\_I\_4 \*Invited 16:55–17:25

###### Glass Transition Temperature as a Unified Parameter to Design Self-Healable Elastomers

Jae-Man Park<sup>1</sup>, Chang Seo Park<sup>1</sup>, Sang Kyu Kwak<sup>2</sup>, and Jeong-Yun Sun<sup>1</sup>

(<sup>1</sup>Seoul National University, <sup>2</sup>Korea University)

##### TS06T5\_O\_5 17:25–17:40

###### Systematic Design of 3D Corona Phase Interfaces to Accelerate Sensor Development Time

Sooyeon Cho

(Sungkyunkwan University)

##### TS06T5\_O\_6 17:40–17:55

###### Shape-Adaptive Multiplexed Phototransistor Arrays using Stretchable Color-Sensitive Quantum Dot Nanocomposites

Jiyong Yoon and Donghee Son

(Sungkyunkwan University)

TS06T5\_O\_7

17:55-18:10

**Solution-Processed van der Waals Thin Films for Phototransistor Array**

Jihyun Kim and Joohoon Kang

*(Sungkyunkwan University)*

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## [TS06F7]

### Nanomaterials and Emerging Technologies for Next Generation Sensors 5

Date & Time	July 5(Fri.), 2024 / 14:00–16:30
Place	Room 208
Session Chair(s)	Chan Ho Park (Gachon Univ.)

#### TS06F7\_O\_1

14:00–14:15

##### Surface Functionalization of Graphene for Selective and Flexible Chemical Sensor

Seungsoo Kim<sup>1</sup> and Ho Won Jang<sup>1,2</sup>

(<sup>1</sup>Seoul National University, <sup>2</sup>Advanced Institute of Convergence Technology)

#### TS06F7\_O\_2

14:15–14:30

##### Electrochemically Chlorinated Graphene for Ultrafast NO<sub>2</sub> Detection at Room Temperature

Jaeyeon Oh<sup>1</sup>, Sungjin Cho<sup>1</sup>, Ansoon Kim<sup>1</sup>, Woo Lee<sup>1</sup>, Seongpil An<sup>2</sup>, and Yeonhoo Kim<sup>1</sup>

(<sup>1</sup>KRISS, <sup>2</sup>Sungkyunkwan University)

#### TS06F7\_O\_3

14:30–14:45

##### Investigation of Improved NO<sub>2</sub> Sensing Property of Substitutional Transition Metal-Doped Molybdenum Disulfide based on In-situ Raman Analysis

Jae-Woo Seo, Ga-Yeon Baek, Seung-Ho Choi, Yeon-Joo kim, and Seon-Jin Choi

(Hanyang University)

#### TS06F7\_O\_4

14:45–15:00

##### MWCNT-MOF Composites Functionalized with Schiff Base Derivatives for Selective Detection of Heavy Metal Ion

Yeon-Joo Kim, Seung-Ho Choi, Jae-Woo Seo, Ga-Yeon Baek, and Seon-Jin Choi

(Hanyang University)

#### TS06F7\_O\_5

15:00–15:15

##### Metalloporphyrin-Functionalized Polymer-SWCNT Composites: Effect of Metal Chelation on NO<sub>2</sub> Sensing Properties

Ga-Yeon Baek, Seung-Ho Choi, Jae-Woo Seo, Yeon-Joo Kim, and Seon-Jin Choi

(Hanyang University)

TS06F7\_O\_6 15:15–15:30

**Metal-Center Effect of Metalloporphyrin-Based Selectors on Chemiresistive Heavy Metal Ion Sensing**

Seung-Ho Choi, Jae-Woo Seo, Yeon-Joo Kim, Ga-Yeon Baek, and Seon-Jin Choi

*(Hanyang University)*

TS06F7\_O\_7 15:30–15:45

**Exclusive and Ultrasensitive Detection of H<sub>2</sub>S at Low Temperature using MOF/SnS<sub>2</sub> Heterostructure**

Soo Min Lee and Ho Won Jang

*(Seoul National University)*

TS06F7\_O\_8 15:45–16:00

**Room Temperature Operation of CO<sub>2</sub> Gas Sensor based on Ca & Al Co-Doped ZnO**

Eunjin Kim<sup>1</sup>, Daewoong Jung<sup>2</sup>, Gil Sik Lee<sup>1</sup>, and Jeong Bong Lee<sup>3</sup>

*(<sup>1</sup>University of Texas at Dallas, <sup>2</sup>KITECH, <sup>3</sup>Baylor University)*

TS06F7\_O\_9 16:00–16:15

**V<sub>2</sub>O<sub>5</sub> Humidity Sensor for Wide Range Humidity Detection**

Sung Jin Cho<sup>1,2</sup>, Jae Yeon Oh<sup>1</sup>, Hyun Ho Kim<sup>3</sup>, and Yeon Hoo Kim<sup>1,2</sup>

*(<sup>1</sup>KRISS, <sup>2</sup>UST, <sup>3</sup>Kumho National Institute of Technology)*

TS06F7\_O\_10 16:15–16:30

**Unveiling the Potential of MAPbI<sub>3</sub>-PVDF Composite Films for Self Powered Pressure and Broadband Light-Sensing Applications**

Venkatraju Jella, Swathi Ippili, and Soon-Gil Yoon

*(Chungnam National University)*

## [TS06] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS06W\_BP\_1

**Tungsten-Doped Molybdenum Disulfide for Improved NO<sub>2</sub> Sensing Properties at Room Temperature**  
Jae-Woo Seo, Ga-Yeon Baek, Seung-Ho Choi, Yeon-Joo kim, and Seon-Jin Choi  
(Hanyang University)

### TS06W\_BP\_2

**Two-Dimensional Conductive Cu-Based Metal-Organic Frameworks for Reversible and Reproducible m-Xylene Sensing**  
Gyeong-Won Kwak, Jae-Woo Seo, and Seon-Jin Choi  
(Hanyang University)

### TS06W\_BP\_3

**Highly Sensitive Photon Upconversion Moisture-Sensing Hydrochromic Smart Materials for Cryptographic Applications**  
Joo Hyeong Han and Won Bin Im  
(Hanyang University)

### TS06W\_BP\_4

**Size-Controlled Co-MOF-74 for Improved NH<sub>3</sub> Adsorption Property**  
Gyeong-Won Kwak, Jae-Woo Seo, and Seon-Jin Choi  
(Hanyang University)

### TS06W\_BP\_5

**WS<sub>2</sub> Nanoflakes Functionalized with Porous ZnO Nanocubes for Improved NO<sub>2</sub> Sensing Properties**  
Jae-Woo Seo, Ga-Yeon Baek, Seung-Ho Choi, Yeon-Joo kim, and Seon-Jin Choi  
(Hanyang University)

### TS06W\_BP\_6

**Electrochemical Aptasensing for Exploring the Interplay between Inflammation and Psychological Distress through Salivary Interleukin-6 (IL-6) and Cortisol Detection**  
Kyungyeon Lee, Sunghyun Park, and Jayoung Kim  
(Yonsei University)

### TS06W\_BP\_7

**Computational Mechanism Study of Metalloporphyrin Functionalized SWCNT for NO<sub>2</sub> Sensing**  
Ga-Yeon Baek, Seung-Ho Choi, Jae-Woo Seo, Yeon-Joo Kim, and Seon-Jin Choi  
(Hanyang University)



**TS06W\_BP\_8**

**Miniaturized Neural Probe with Integrated Three-Electrode System for Simultaneous Real Time Detection of Dopamine and Glutamate**

Suhyung Kim, Dongwook Lee, Sunghyun Park, and Jayoung Kim

*(Yonsei University)*

**TS06W\_BP\_9**

**Multi-Scale Micro/Nano-Gap Device-Based Indirect Quantitation of Creatinine through its Chemical Reaction with Electrochemical Probe**

Hyun Jung Kim, Jong Kwan Park, Dong Hyun Kim, Seok Cheol Kim, Aejin Lee, Dong Hun Kim, and Wan Soo Yun

*(Sungkyunkwan University)*

**TS06W\_BP\_10**

**Humidity-Assisted NO<sub>2</sub> Detection under Visible Light Activation with a Submicron Conformal Polymeric Bilayer Coating**

Minhyun Kim, Booseok Jeong, and Il-Doo Kim

*(KAIST)*

**TS06W\_BP\_11**

**Enhanced Electrochemical Detection of Small Molecules using Affinity Based Molecularly Imprinted Composite Polymer**

Yujeong Lee, Kyungyeon Lee, and Jayoung Kim

*(Yonsei University)*

**TS06W\_BP\_12**

**Non-Covalent Selector Functionalization of P4VP-SWCNT Composite for Selective Acetate Detection Across  $\pi$ - $\pi$  Interaction**

Yeon-Joo Kim, Seung-Ho Choi, Jae-Woo Seo, Ga-Yeon Baek, and Seon-Jin Choi

*(Hanyang University)*

**TS06W\_BP\_13**

**Multimodal Breath Analysis System with Deep Learning for Early Detection of Lung Cancer**

Byeongju Lee<sup>1,2</sup>, Junyeong Lee<sup>1</sup>, Jin-Oh Lee<sup>1</sup>, Yoohwa Hwang<sup>3</sup>, Hyung-Keun Bahn<sup>3</sup>, Inkyu Park<sup>2</sup>, Sanghoon Jheon<sup>3</sup>, and Dae-Sik Lee<sup>1</sup>

*(<sup>1</sup>ETRI, <sup>2</sup>KAIST, <sup>3</sup>Seoul National University)*

**TS06W\_BP\_14**

**Surface-Enhanced Raman Spectroscopy in the Live Cell to Detect the mRNA**

Ju Eun Cho<sup>1</sup> and Dong-Kwon Lim<sup>1,2</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIST)*

### TS06W\_BP\_15

#### Synthesis Optimization of Asymmetric Squaramide Derivatives

Seung-Ho Choi, Yeon-Joo Kim, Dong-Hee Lee, Seung-Jae Lee, Se-Hong Park, and Seon-Jin Choi  
(Hanyang University)

### TS06W\_BP\_16

#### Chemically Modified MWCNT–UiO–66 Composites for Electrochemical Heavy Metal Ion Sensor

Dong-Hee Lee, Seung-Ho Choi, Yeon-Joo Kim, and Seon-Jin Choi  
(Hanyang University)

### TS06W\_BP\_17

#### High Sensitive Near-Infrared Image Sensor using Degenerate Silicon

YunJu Oh, Byeong Seon Kim, Seok Ki Lee, E Kyoung Kim, Areum Han, and Moon Hee Kang  
(Chungbuk National University)

### TS06W\_BP\_18

#### Transition–Metal Doped Ceria Nanoparticles Loaded Metal Oxide Nanofibers: Heightened Surface Activity for Chemiresistors

Jong Won Baek and Il-Doo Kim  
(KAIST)

### TS06W\_BP\_19

#### Amine Engineered Interpenetrating Polymer Semiconductor Network for Ultrasensitive Chemosensor

Elvis K. Boahen, Hyukmin Kweon, Hayoung Oh, and Do Hwan Kim  
(Hanyang University)

### TS06W\_BP\_20

#### Photothermal–Triggered Nanoparticle Redispersion on Metal Oxides

Euichul Shin, Jong Won Baek, and Il-Doo Kim  
(KAIST)

### TS06W\_BP\_21

#### Systematic Design of Aptamer–Modified Extended–Gate MOSFET Biosensor for Sensitive Cortisol Detection

Sunghyun Park and Jayoung Kim  
(Yonsei University)

### TS06W\_BP\_22

#### Enhanced Gas Sensing Performance with High Entropy Alloy Functionalized Tungsten Oxide Nanofibers

Sang-Joon Kim<sup>1,2</sup>  
(<sup>1</sup>KRICT, <sup>2</sup>UST)

**TS06W\_BP\_23**

**The Enhancement in Low Sensitivity VOC Detection by Post-Concentrated Adsorbent Direct Heating/Desorption System**

Dong gwon Kang<sup>1,3</sup> and Sang-Joon Kim<sup>1,2</sup>

(<sup>1</sup>KRICT, <sup>2</sup>UST, <sup>3</sup>Yonsei University)

**TS06W\_BP\_24**

**Iridium Nanotrough Networks for Functionalized with Pd Catalyst: Highly Sensitive Hydrogen Sensor**

Ji-Won Choe<sup>1</sup> and Sang-Joon Kim<sup>1,2</sup>

(<sup>1</sup>KRICT, <sup>2</sup>UST)

**TS06W\_BP\_25**

**Oball-Shaped SnO<sub>2</sub> Hemispheres by Pt Infiltrated Porous Block Copolymer: Superior Detection of Formaldehyde**

Hyunji Lee<sup>1,2</sup> and Sang-Joon Kim<sup>1,2</sup>

(<sup>1</sup>KRICT, <sup>2</sup>UST)

**TS06W\_BP\_26**

**Oxygen-Mediated Surface Engineering of 3D Porous Graphene for All Graphene Humidity Sensing Devices**

Yeong Min Kwon, Min Hyeok Lim, Garam Bae, Hyeong-ku Jo, Do Hyung Lee, and Wooseok Song

(KRICT)

**TS06W\_BP\_27**

**Copper(I) Iodide Nanoparticles Embedded Stretchable Thermoelectric Fibers for Multimodal Temperature, Strain, and Pressure Sensing**

Kukro Yoon and Taeyoon Lee

(Yonsei University)

**TS06W\_BP\_28**

**Investigating the Role of Transition Metals of Zn, Fe and Cu and the Basis of Single and Double-Cavity Defective Graphenes in the Regeneration of CO<sub>2</sub> Gas**

Rahim Rahman-Abadi, Mohammad Haghu, Zahra Rostami, and Reza Behjatmanesh Ardakani

(Payame Noor University)

## [TS06] Poster Session 2 Best Poster Awards Candidates

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

### TS06T\_BP\_1

#### **Rational Design of a Mobile Fiber System Integrated nIR Fluorescent Sensors for Chemical Production On-Site Monitoring**

Damee Koh, Youngwook Cho, Nahyeon Kim, and Soo-Yeon Cho  
(Sungkyunkwan University)

### TS06T\_BP\_2

#### **Rational Design of nIR Fluorescent Nanosensor Array for Multivariate Cellular Products Monitoring**

YoungWook Cho and Soo-Yeon Cho  
(Sungkyunkwan University)

### TS06T\_BP\_3

#### **Integration of nIR Fluorescent Nanosensor 3D Micropatch for Molecular Recognition in Infinitesimal Volume Biofluids**

Seyoung Shin, Yeon Soo Lee, Changhyun Pang, and Soo-Yeon Cho  
(Sungkyunkwan University)

### TS06T\_BP\_4

#### **Multivariate Analysis of ROS Production Kinetics using Molecular Recognitions of nIR Fluorescent Nanosensors**

Nahyeon Kim, Damee Koh, and Soo-Yeon Cho  
(Sungkyunkwan University)

### TS06T\_BP\_5

#### **Deep Learning-Integrated Single-Cell Image Cytometry for Precision Evaluation of Therapeutic Efficacy in Lymphoma Patients**

Seongcheol Park, Youngho Song, Changyu Tian, Sang Eun Yoon, and Soo-Yeon Cho  
(Sungkyunkwan University)

### TS06T\_BP\_6

#### **Machine Learning Integrated Fluorescent Nanosensors Provide Enhanced Sensitivity for Heavy Metals Detection**

Changyu Tian, Yullim Lee, and Sooyeon Cho  
(Sungkyunkwan University)

**TS06T\_BP\_7**

**Nanosensor Chemical Cytometry to Reveal Aging Heterogeneity in Dermal Fibroblast Populations**

Youngho Song, Changyu Tian, Seongcheol Park, Changi Baek, and Soo-Yeon Cho

*(Sungkyunkwan University)*

**TS06T\_BP\_8**

**Memristor-Based pH Sensor for Application in an Artificial Gustatory System**

Da Ye Kim, June Soo Kim, Hyunjun Kim, Noah Jang, Yujin Nam, Maeum Han, and Seong Ho Kong

*(Kyungpook National University)*

**TS06T\_BP\_9**

**Lab-on-a-Chip Based Pump-Less Nanofluidic Resistive Pulse Sensing Platform for Rapid Liquid Biopsy**

Hyunjun Kim, June Soo Kim, Noah Jang, Da Ye Kim, Yujin Nam, Maeum Han, and Seong Ho Kong

*(Kyungpook National University)*

**TS06T\_BP\_10**

**Vacancy Modulated Memristive Gas Sensor for Selective Gas Detection for Exhaled Breath Analysis**

June Soo Kim, Maeum Han, Hyunjun Kim, Da Ye Kim, Noah Jang, Yujin Nam, and Seong Ho Kong

*(Kyungpook National University)*

**TS06T\_BP\_11**

**3D-Printed Flexible Pressure Sensors for Bio-Signal Monitoring Applications**

Hyeon Yun Jeong, Soo Wan Kim, Hyeon Beom Kim, Jeong Beom Ko, and Sung Hyun Park

*(KITECH)*

**TS06T\_BP\_12**

**Development of CNT-MOF Composite with Increased Acidity for Chemiresistive Ammonia Detection**

Se-Hong Park, Yeon-Joo Kim, Ga-Yeon Baek, Seung-Ho Choi, Jae-Woo Seo, and Seon Jin Choi

*(Hanyang University)*

**TS06T\_BP\_13**

**Rapid Detection of Circulating Tumor DNA using nIR Fluorescent Single Walled Carbon Nanotube by Oligonucleotide Hybridization**

SeungJu Lee and Soo-Yeon Cho

*(Sungkyunkwan University)*

**TS06T\_BP\_14**

**PEG-Lipid Wrapped nIR Fluorescent SWCNT for Antibody-Free Virus Identifications using 3D Corona Interfaces**

Yullim Lee<sup>1</sup>, Woojin Kim<sup>2</sup>, Yongjoo Kim<sup>2</sup>, and Sooyeon Cho<sup>1</sup>

*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Kookmin University)*

### TS06T\_BP\_15

#### Excitation Wavelength Optimization of Europium Doped Carbon Dots (Eu-CDs) for Highly Selective and Sensitive Detection of Tetracycline

Aigerim Babenova, Kamila Zhumanova, and Timur Atabaev

*(Nazarbayev University)*

### TS06T\_BP\_16

#### Development of Visible-NIR Responsive Nanoporous Morphology on Large-Scale IGZO and Realization of High-Performance Image Sensor

Jaeseong Kim, Anamika Sen, Siyun Lee, and Sunkook Kim

*(Sungkyunkwan University)*

### TS06T\_BP\_17

#### Development of Zero-Dimensional Lead-Free Metal Halide Indirect Type X-Ray Imaging Detector Suitable for Extreme Environments

Joo Hyeong Han and Won Bin Im

*(Hanyang University)*

### TS06T\_BP\_18

#### Multifunctional Thermoelectric-Based Sensor Systems using a Highly Crystalline, Transferable Copper Sulfide Membrane

Myungwoo Choi<sup>1</sup>, Geonhee Lee<sup>2</sup>, Yea-Lee Lee<sup>2</sup>, Hosun Shin<sup>3</sup>, Seokwoo Jeon<sup>1</sup>, Jeong-O Lee<sup>2</sup>, and Donghwi Cho<sup>2</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KRICT, <sup>3</sup>KRISS)*

### TS06T\_BP\_19

#### Stabilization of Single-Atom Catalyst on Metal Oxide Derived by Dual Ligand Metal Hydroxide-Organic Frameworks

Sungyoon Woo and Il-Doo Kim

*(KAIST)*

### TS06T\_BP\_20

#### Hybrid Structure of Metal Oxide and Metal-Organic Framework for Enhanced Selectivity of Chemiresistive Sensor via Unique Top-Down Lithography

Hyewon Jeon, Jaedong Jang, Hohyung Kang, and Hee-Tae Jung

*(KAIST)*

### TS06T\_BP\_21

#### Unveiling the Potential of Hydrogen-Substituted Graphdiyne for Fast and Reversible Gas Sensing Capability

Hohyung Kang<sup>1</sup>, Yoon Tae Nam<sup>1</sup>, Sanggyu Chong<sup>1</sup>, Jihan Kim<sup>1</sup>, Soo-Yeon Cho<sup>2</sup>, and Hee Tae Jun<sup>1</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>Sungkyunkwan University)*

**TS06T\_BP\_22**

**Semi-Automated Preparation of ssDNA-Wrapped SWCNTs Dispersions for Consistent Sensor Performance**

Jaewon Chang, Sanghwa Jeong, Yeongjoo Suh, and Seonghyeon An  
(*Pusan National University*)

**TS06T\_BP\_23**

**Atomic Layer Modified 3D Pd Nanochannels for High-Performance H<sub>2</sub> Sensor**

Ahyeon Cho<sup>1</sup>, Hojin Kang<sup>2</sup>, Hee-Tae Jung<sup>1</sup>, and Soo-Yeon Cho<sup>2</sup>  
(<sup>1</sup>*KAIST*, <sup>2</sup>*Sungkyunkwan University*)

**TS06T\_BP\_24**

**Ultrasensitive and Highly Selective Heterostructured Chemiresistive Sensor for Diethyl Carbonate Leakage in a Lithium-Ion Battery**

Seunguk Son, Hohyung Kang, Hayeon Kim, and Hee-Tae Jung  
(*KAIST*)

**TS06T\_BP\_25**

**Electrochemical Sensor Integrated Smart Contact Lens for Continuous Cortisol Monitoring**

Minyeong Yoon<sup>1,2,3</sup>, Seung-Rok Kim<sup>2,3</sup>, Yullim Lee<sup>1,2</sup>, Soo-Yeon Cho<sup>1</sup>, and Ali Javey<sup>2,3</sup>  
(<sup>1</sup>*Sungkyunkwan University*, <sup>2</sup>*University of California at Berkeley*, <sup>3</sup>*Lawrence Berkeley National Laboratory*)

**TS06T\_BP\_26**

**Quantitative Detecting Methodology for Identifying Poorly Soluble Molecules in Microparticles**

Yuri Nam and Chan Ho Park  
(*Gachon University*)

**TS06T\_BP\_27**

**Mo<sub>2</sub>TiC<sub>2</sub>T<sub>x</sub> MXene/Polyaniline Nanocomposite for Highly Selective NH<sub>3</sub> Sensing at Room Temperature and Humid Environment**

Juyun Lee<sup>1,2</sup> and Seon Joon Kim<sup>1</sup>  
(<sup>1</sup>*KIST*, <sup>2</sup>*Korea University*)

**TS06T\_BP\_28**

**Neutral pH-Sensitive Polymer Chains as a Powerful Building Block for Next-Generation Sensors**

Min Kyeong Pyo and Chan Ho Park  
(*Gachon University*)

## [TS06] Poster Session 2

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

### TS06T\_P\_1

#### Enhancing Infrared Performance of Two-Dimensional Tin Monoselenide Photodetectors through Tellurium Doping

Do Hyung Lee<sup>1,2</sup>, Hyeong-ku Jo<sup>1,2</sup>, Min Hyeok Lim<sup>1</sup>, Garam Bae<sup>1</sup>, YeongMin Kwon<sup>1</sup>, and Wooseok Song<sup>1</sup>  
(<sup>1</sup>KRICT, <sup>2</sup>Sungkyunkwan University)

### TS06T\_P\_2

#### Development of Wavelength-Selective Prefabricated 2D photodetector using Up-Conversion Particle

Hyeongku Jo, Dohyung Lee, Yeong Min Kwon, Da Som Song, Minhuk Lim, and Wooseok Song  
(KRICT)

### TS06T\_P\_3

#### Performance-Based Evolution of Serotonin Optical Nanosensor from Random ssDNA-SWCNT Constructs

Nguyen Tri Tuan and Sanghwa Jeong  
(Pusan National University)



## [TS06] Poster Session 3

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 10:30-12:00
<b>Place</b>	Exhibition Hall 4,5

### TS06F\_P\_1

#### **Flexo-Phototronics: Boosting the Photoresponse of ZnAl:LDH Ns-Based UV Sensor**

Alphi Maria Thomas and Soon-Gil Yoon

*(Chungnam National University)*

### TS06F\_P\_2

#### **Near Infrared-Interactive Display for Neuromorphic Photothermal Applications**

Jihye Jang and Cheolmin Park

*(Yonsei University)*

### TS06F\_P\_3

#### **Dual-Responsive Colorimetric Gas Sensor using Metalloporphyrin Embedded Elastomer**

Seung-Ho Choi, Jae-Woo Seo, Yeon-Joo Kim, Ga-Yeon Baek, and Seon-Jin Choi

*(Hanyang University)*

### TS06F\_P\_4

#### **Chemically and Electronically Active Metal Ions on InAs Quantum Dots for Infrared Detectors**

Jaeyoung Seo, Seongchan Kim, Namyoung Gwak, Seungki Shin, Dongjun Yeo, Hyein Kong, Yunseo Lee, Jina Na, and Nuri Oh

*(Hanyang University)*

### TS06F\_P\_5

#### **Fe-MST using van der Waals Heterostructure based on the Characteristics of Ferroelectric-Phase Transition Materials**

Dokyoeng Yun and WooJong Yu

*(Sungkyunkwan University)*

### TS06F\_P\_6

#### **Metal Oxides Treated by Flash-Thermal Shock towards VSC Gas Sensors**

Jun-Hwe Cha

*(FTRI)*

### TS06F\_P\_7

#### **Electrical Generation of Eco-Friendly Piezoelectric Silk Nanofibers Related to Molecular Binding**

Sangil Yoon, Hyunseung Kim, Ki-Tae Lee, and Chang Kyu Jeong

*(Jeonbuk National University)*

### TS06F\_P\_8

#### **Colloidal Synthesis of P-Type $\text{Zn}_3\text{As}_2$ Nanocrystals for Infrared Photodetector**

Seongchan Kim, Jaeyoung Seo, Dongjoon Yeo, Sungwon Kim, Jina Na, and Nuri Oh

*(Hanyang University)*

### TS06F\_P\_9

#### **$\text{NO}_2$ Gas Sensing Characteristics of Resistor-Type Tin-Oxide-Based Gas Sensors with Different Post-Deposition Annealing Conditions**

Donghee Kim, Woo Young Choi, and Jong-Ho Lee

*(Seoul National University)*

### TS06F\_P\_10

#### **Enhancing CMOS Inverter Stability with Low-Temperature Zn-ON and Tellurium Integration**

Junho Lee, Muhammad Naqi, Yongin Cho, Joo On Oh, Hyun Yeol Rho, and Sunkook Kim

*(Sungkyunkwan University)*

### TS06F\_P\_11

#### **Enhanced Hydrogen Sensing using Pd with Silicon/Graphene Heterostructure**

Jihun Sim and Woojong Yu

*(Sungkyunkwan University)*

### TS06F\_P\_12

#### **Stable and Selective Surface Activation: Breathable MOFs Layer on Atomically Grown 2D $\text{SnS}_2$**

Gwang Su Kim and Ji-Soo Jang

*(KIST)*

### TS06F\_P\_13

#### **2D $\text{Sr}_2\text{Nb}_3\text{O}_{10}$ Overlayered $\text{SnO}_2$ Nanorods for Early Diagnosis of Skin Cancer through Skin Gas**

Jung-Won An<sup>1,2</sup>, Gwang Su Kim<sup>1</sup>, Ji-Won Choi<sup>1,3</sup>, Ho won Jang<sup>2</sup>, and Ji-Soo Jang<sup>1</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Seoul National University, <sup>3</sup>UST-KIST)*

**TS06F\_P\_14**

**Asymmetric and Skin-Mimicking Hydrogels with Wide Temperature Tolerance and Superior Elasticity for High-Performance Strain Sensors**

Yunchao Xiao<sup>1</sup>, Zemeng Yang<sup>1</sup>, Man Xi<sup>1</sup>, Jianxun Fu<sup>2</sup>, Yang Jiang<sup>1</sup>, and Yi Li<sup>1</sup>

(<sup>1</sup>Jiaxing University, <sup>2</sup>Shanghai University)

**TS06F\_P\_15**

**Ultrasonic Spray Chemistry: Atomized Chemical Reaction for Heteroatom Bond (C-X) Formation**

Hyun-Tak Kim

(KRICT)

**TS06F\_P\_16**

**Selective Sulfuric Gas Detection via Photocatalytic Mixed Matrix Membrane**

Dong Hyuk Kwak, Minhyun Kim, and Il-Doo Kim

(KAIST)

**TS06F\_P\_17**

**One-Step Laser Synthesis Method of Porous Carbon Support for Microfluidic Electrochemical Sensing Applications**

Hee Ra Lee, Hong Gun Kim, and Seoung-Ki Lee

(Pusan National University)

**TS06F\_P\_18**

**Tuning the Electronic Band-Gaps of Graphene Quantum Dots for Controlling the Active Wavelength of Light-Activated Gas Sensor**

Jinho Lee, Minhyun Kim, Seyeon Park, and Il-Doo Kim

(KAIST)

**TS06F\_P\_19**

**Graphene-Based Humidity Sensor Enhanced by Addition of Noble Montmorillonite**

Ju Hyoeng Yu<sup>1</sup>, Min Cheol Cheon<sup>1</sup>, Jeong Ki Lee<sup>2</sup>, and Seoung-Ki Lee<sup>1</sup>

(<sup>1</sup>Pusan National University, <sup>2</sup>Pukyong National University)

**TS06F\_P\_20**

**Surface Functionalization of MXene via Sulfonic Acid Diazonium Salt for Highly Selective NH<sub>3</sub> Gas Sensing**

Seongeun Lee<sup>1,2</sup> and Seon Joon Kim<sup>1,3</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea University, <sup>3</sup>UST)

### TS06F\_P\_21

#### **Electrospinning and Carbonization of Nanofibers with Metal–Organic Frameworks**

Sang Ho Shin, TaeGyeong Lim, and Ji Won Suk

*(Sungkyunkwan University)*

### TS06F\_P\_22

#### **Stretchable Strain Sensors using 3D Graphene/Carbon Nanofiber Structures for Human Motion Detection**

Hyeon–Jong Lee, Bong Hyun Seo, TaeGyeong Lim, and Ji Won Suk

*(Sungkyunkwan University)*

### TS06F\_P\_23

#### **Molecular Design for Tunable Ionic Thermopower with High Stretchability**

Minju Park<sup>1</sup> and Heesuk Kim<sup>2</sup>

*(<sup>1</sup>KRICT, <sup>2</sup>KIST)*

### TS06F\_P\_24

#### **Understanding Enhanced Ammonia Gas Sensing Properties of La–Doped WO<sub>3</sub> in the Presence of Water**

Haleem Ud Din and Jung–Hoon Lee

*(KIST)*

### TS06F\_P\_25

#### **Decorate a–C on TeO<sub>2</sub> Nanowires to Enhance Detecting NO<sub>2</sub> Performance at Room Temperature**

Sungjoon Moon, Ka Yoon Shin, Wansik Oum, Eun Bi Kim, and Hyoun Woo Kim

*(Hanyang University)*

# Technical Sessions

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## **[TS07] Nanomaterials for Biotechnology**

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### **Theme: Nanomaterials for Biotechnology Applications**

Biomimetic nanomaterial has been considered as a key resource to overcome several limitations and huddles in various biotechnology applications. In this session, we will introduce recent cutting-edge biotechnologies including biodegradable nanomaterials, nanobiosensors, nanobiochips, nanomaterial-based biomimetics, and nanoscale-based cell engineering.

### [TS07W1]

#### Nanomaterials for Biotechnology 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 206B
Session Chair(s)	Ki Wan Bong (Korea Univ.)

TS07W1\_O\_1

09:00–09:15

##### Sintering-Free Liquid Metal Ink for Spray-Printed Wearable Electronics

Sangwon Kim<sup>1</sup>, Sangin Kim<sup>1</sup>, Tae Young Kim<sup>1</sup>, Kijun Park<sup>1</sup>, and Jungmok Seo<sup>1,2</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>Lynk Solutech Inc.)

TS07W1\_O\_2

09:15–09:30

##### Development of Folate-Conjugated Albumin/ICG Nanoplatforrm for Image-Induced Preoperative

Jiyeon Kim<sup>1,2</sup>, Ji Yong Park<sup>1,3</sup>, Yu Jin Chung<sup>1,2</sup>, Jin Sil Kim<sup>1</sup>, Ran Ji Yoo<sup>3</sup>, Yu Jin Shin<sup>3</sup>, Kyuwan Kim<sup>1</sup>, Hye Yeon Seo<sup>2</sup>, Min Koung Kim<sup>3</sup>, Se Chan Oh<sup>3</sup>, Yong Jin Lee<sup>4</sup>, Kyo Chul Lee<sup>4</sup>, and Yun-Sang Lee<sup>1,2,3</sup>

(<sup>1</sup>Seoul National University College of Medicine, <sup>2</sup>Seoul National University, <sup>3</sup>Seoul National University Hospital, <sup>4</sup>KIRAMS)

TS07W1\_I\_3 \*Invited

09:30–10:00

##### Dose-Controllable Long-Term Drug Delivery Systems

Xingyu He, Zheng Yuan, Avery Zheng, Thomas Waterkotte, Kevin Li, Winston Kao, and Yoonjee Park

(University of Cincinnati)

TS07W1\_I\_4 \*Invited

10:00–10:30

##### Next-Generation Biomedical and Neural Interfaces from Fibers to Nanomaterials

Seongjun Park

(KAIST)

## [TS07W2]

### Nanomaterials for Biotechnology 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:40
Place	Room 206B
Session Chair(s)	Tae Joon Kang (KRIBB)

TS07W2_I_1	<b>*Invited</b>	15:40–16:10
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#### Dynamic Interference Nanolithography Integrated with Machine Learning for Predictive Stem Cell Fate Mapping

Letao Yang<sup>1,2</sup>

(<sup>1</sup>Tongji University, <sup>2</sup>Shanghai Tongji Hospital)

TS07W2_O_2	16:10–16:25
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#### Modulus-Tunable 3D Printable Hydrogel Ink with Functionalized Carbon Nanotube and Laponite XLG Fillers

Minkyong Kang, Jae Park, Soo A Kim, Ju Yeon Kim, Dae Woo Kim, Kijun Park, and Jungmok Seo

(Yonsei University)

TS07W2_O_3	16:25–16:40
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#### Development of Osteochondral Structure Targeted Multifunctional Bioink by Applying Peptide Introduction and Calcium Phosphate Phase Transition

Jueun Kim, Honghyun Park, and Hui-Suk Yun

(KIMS)

TS07W2_I_5	<b>*Invited</b>	16:40–17:10
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#### Plasmon-Enhanced Multiplexed Analysis of Single Extracellular Vesicles

Mi Ho Jeong, Jae-Sang Hong, Ursula Winter, Cesar M. Castro, and Hyungsoon Im

(Massachusetts General Hospital)

TS07W2_O_6	17:10–17:25
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#### Development of Peptide-Immobilized Bioinks through Photo Induced Crosslinking of Unmodified Proteins

Yeong-Jin Choi

(KIMS)

TS07W2\_O\_7

17:25–17:40

**Rapid Realtime PCR using Photothermal Conversion of Gold Nanoparticles for Detection of Salmonella Typhimurium**

Sun Hee Ahn, Do Hyun Jeong, and Jae Sung Ahn

*(KOPI)*

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## [TS07T3]

### Nanomaterials for Biotechnology 3

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 09:00–09:45
<b>Place</b>	Room 206B
<b>Session Chair(s)</b>	Youngeun Kwon (Dongguk Univ.)

#### TS07T3\_O\_1

09:00–09:15

##### **Precise Profiling of Exosomal Biomarkers through Programmable Curved Plasmonic Nanoarchitecture-Based Biosensor for Clinical Diagnosis of Alzheimer's Disease**

Sojin Song<sup>1,2</sup>, Nakwon Choi<sup>2</sup>, and Sang Jun Sim<sup>1</sup>*(<sup>1</sup>Korea University, <sup>2</sup>KIST)*

#### TS07T3\_O\_2

09:15–09:30

##### **Masking and Identification of Bitterness by Bioelectronic Tongue based on Bitter Taste Receptor Agonism and Antagonism**

Maryam Shabbir and Oh Seok Kwon

*(Sungkyunkwan University)*

#### TS07T3\_O\_3

09:30–09:45

##### **Quantitative Interaction of Nano-Colloids with Cells**

Wolfgang J. Parak

*(Universität Hamburg)*

## [TS07T4]

### Nanomaterials for Biotechnology 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:00
Place	Room 206B
Session Chair(s)	Hong Nam Kim (KIST)

#### TS07T4\_I\_1 \*Invited

14:00–14:30

#### Rapid and High Sensitive Diagnostic Method of African Swine Fever Virus using an Antibody–Conjugated–Point of Care Tests

Kyung Ho Kim<sup>1</sup>, Yurun Miao<sup>2</sup>, Oh Seok Kwon<sup>1</sup>, and Yong–Sam Jung<sup>2</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Nanjing Agricultural University)

#### TS07T4\_I\_3 \*Invited

14:30–15:00

#### Nanobiomaterials for Advanced Organoid Platforms

Seung–Woo Cho<sup>1,2</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>IBS)

**[TS07T5]****Nanomaterials for Biotechnology 5**

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 15:40-16:40
<b>Place</b>	Room 206B
<b>Session Chair(s)</b>	Tae Hyung Kim (Chung-Ang Univ.)

<b>TS07T5_I_2</b>	<b>*Invited</b>	<b>15:40-16:10</b>
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**Self-Healing, Stretchable, and Tissue-Adhesive Materials for Stable Bioelectronics**

Donghee Son

*(Sungkyunkwan University)*

<b>TS07T5_O_3</b>	<b>16:10-16:25</b>
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**A Nanostructured Electrochemical Platform with a Thermally Annealing Process for Long-Term and Label-Free Monitoring of Cellular Metabolism**

Kyeong-Mo Koo, Chang-Dae Kim, and Tae-Hyung Kim

*(Chung-Ang University)*

<b>TS07T5_O_4</b>	<b>16:25-16:40</b>
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**A Mechanically Resilient and Tissue-Conformable Hydrogel with Hemostatic and Antibacterial Capabilities for Wound Care**Tae Young Kim<sup>1</sup>, Jae Park<sup>1</sup>, Seung-Woo Cho<sup>1</sup>, Jayoung Kim<sup>1</sup>, and Jungmok Seo<sup>1,2</sup>*(<sup>1</sup>Yonsei University, <sup>2</sup>Lynk Solutec Inc.)*

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## [TS07] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS07W\_BP\_1

#### Synthesis of Silica-Coated Gold Nanorods with Controlled Porosity of Silica Shell

Minju Lee<sup>1</sup> and Dongkwon Lim<sup>1,2</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST)

### TS07W\_BP\_2

#### A Gold Nanostructured Platform for Assessment of Multipotency in Mesenchymal Stem Cells based on Differences in Cellular Metabolism

Chang Dae Kim, Kyeong Mo Koo, and Tae-Hyung Kim

(Chung-Ang University)

### TS07W\_BP\_3

#### Long-Term Maintenance of Multipotency of Stem Cells using Drug Delivery System-Loaded Polymer Nanoarray

Yun-Sik Eom, Yeon-Woo Cho, and Tae-Hyung Kim

(Chung-Ang University)

### TS07W\_BP\_4

#### Highly Sensitive Rapid Assay for the Detection of Influenza Incorporated with Simple Target Concentration Consisting of Graphene Oxide

Hye Jin Lee, Yun Guang Li, Jaeyeon Yoon, Jihyung Seo, Changyoon Baek, and Junhong Min

(Chung-Ang University)

### TS07W\_BP\_5

#### Ultrasensitive, Specific, and Rapid Detection of SARS-CoV-2 using Isothermal Amplification Integrated with CRISPR/Cas13a

Jaemin Kim<sup>1</sup> and Hyun Gyu Park<sup>2</sup>

(<sup>1</sup>KRIBB, <sup>2</sup>KAIST)

### TS07W\_BP\_6

#### Production of Uniform and Diverse Polymeric Microparticles using Degassed Mold Based Discontinuous Dewetting

Hyeon Ung Kim, Dong Min Shin, Yoon Ho Roh, Seok Joon Mun, and Ki Wan Bong

(Korea University)

**TS07W\_BP\_7**

**The Effect of Size, Shape, and Functional Groups of Nanoscale Materials on an Ice Recrystallization Inhibition Activity**

Yong Duk Kim<sup>1</sup> and Dong-Kwon Lim<sup>1,2</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST)

**TS07W\_BP\_8**

**Enhanced Multiplex Immunoassays through Optimization of Reduced Capture Antibody Conjugation to Encoded Hydrogel Microparticles**

Do Yeon Kim, Jiwoo Kim, Wookyoung Jang, Hyunkyo Roh, and Ki Wan Bong

(Korea University)

**TS07W\_BP\_9**

**Exploration of Mechanisms of Drug Resistance in a Microfluidic Device and Patient Tissues**

Wanyoung Lim<sup>1</sup>, Inwoo Hwang<sup>1</sup>, Jiande Zhang<sup>1</sup>, Zhenzhong Chen<sup>1</sup>, Jeonghun Han<sup>1</sup>, Jaehyung Jeon<sup>1</sup>, Bon-Kyoung Koo<sup>2</sup>, Sangmin Kim<sup>1</sup>, Jeong Eon Lee<sup>1</sup>, Kenneth J. Pienta<sup>3</sup>, Sarah R. Amend<sup>3</sup>, Robert H. Austin<sup>4</sup>, Jee-Yin Ahn<sup>1</sup>, and Sungsu Park<sup>1</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Institute of Molecular Biotechnology of the Austrian Academy of Sciences, <sup>3</sup>The Johns Hopkins University School of Medicine, <sup>4</sup>Princeton University)

**TS07W\_BP\_10**

**Smartphone-Based Iontophoresis Transdermal Drug Delivery System for Cancer Treatment**

Tae Hyeon Kim, Na Yeon Kim, Hee Uk Lee, Ji Wook Choi, Taewook Kang, and Bong Geun Chung

(Sogang University)

**TS07W\_BP\_11**

**Cytotoxicity Assay for Evaluating the Impact of Extracellular Adhesion Molecules on Cancer Cell Killing**

Seong-Eun Kim<sup>1</sup>, Junsang Doh<sup>2</sup>, and HongNam Kim<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Seoul National University)

**TS07W\_BP\_12**

**Herd Immunity on a Chip: Reconstructing Virus Transmission in Human Society**

Jiande Zhang<sup>1</sup>, Narina Jung<sup>1,2</sup>, Wanyoung Lim<sup>1</sup>, Zhenzhong Chen<sup>1</sup>, Byungmook Weon<sup>1</sup>, and Sungsu Park<sup>1</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>CIAS)

**TS07W\_BP\_13**

**Kidney Organoid Gradient Chip for Screening Fabry Disease Drugs**

Ho Yeon Lee<sup>1</sup>, Yoon Young Choi<sup>1</sup>, Jin Won Kim<sup>2</sup>, Ji Wook Choi<sup>1</sup>, Yong Kyun Kim<sup>2</sup>, and Bong Geun Chung<sup>1</sup>

(<sup>1</sup>Sogang University, <sup>2</sup>The Catholic University of Korea)

### TS07W\_BP\_14

#### **Study of Neurodegenerative Diseases using Gut Microbiome-Derived Metabolites and Extracellular Vesicles on a Gut-Brain Axis Chip**

Na Yeon Kim<sup>1</sup>, Ho Yeon Lee<sup>1</sup>, Yoon Young Choi<sup>1</sup>, Sung Jun Mo<sup>2</sup>, Soomin Jeon<sup>2</sup>, Jang Ho Ha<sup>1</sup>, Soo Dong Park<sup>2</sup>, Jae-Jung Shim<sup>2</sup>, Jaehwan Lee<sup>2</sup>, and Bong Geun Chung<sup>1</sup>

(<sup>1</sup>Sogang University, <sup>2</sup>hy Co., Ltd.)

### TS07W\_BP\_15

#### **Simple Multiplex microRNA Detection by Target-Primed DNA Extension in Hydrogel Microparticles**

Wookyoung Jang, Yu Jin Kim, Hyun Kyo Roh, E Loomer Song, and Ki Wan Bong

(Korea University)

### TS07W\_BP\_16

#### **Ultrathin and Durable Anticorrosive Polymer for Ingestible Device**

Jihoon Lim<sup>1</sup>, Booseok Jeong<sup>1</sup>, Jemin Yeun<sup>1</sup>, Sung Gap Im<sup>1</sup>, and Kyoung G. Lee<sup>2</sup>

(<sup>1</sup>KAIST, <sup>2</sup>NNFC)

### TS07W\_BP\_17

#### **Electro-Responsive Hydrogel for Drug Delivery Application**

Sang Hun Lee<sup>1</sup>, Jang Ho Ha<sup>1</sup>, Jae Hyun Lim<sup>1</sup>, Jong Min Lee<sup>2</sup>, and Bong Geun Chung<sup>1,2</sup>

(<sup>1</sup>Sogang University, <sup>2</sup>Yeungnam University College)

### TS07W\_BP\_18

#### **Portable Cellular Monitoring System for Quantitative Analysis of 3D Tumor Spheroids**

Ji Heon Lim, Ji Wook Choi, Na Yeon Kim, and Bong Geun Chung

(Sogang University)

### TS07W\_BP\_19

#### **Designing Polymer Thin Films with Composition Gradient for Robust Anti Biofouling and Corrosion Resistance**

Booseok Jeong<sup>1</sup>, Jihoon Lim<sup>1</sup>, Jemin Yeun<sup>1</sup>, Kyoung G. Lee<sup>2</sup>, and Sung Gap Im<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>NNFC)

### TS07W\_BP\_20

#### **Dual-Stimuli Responsive Silica Nanoparticle-Mediated Neural Differentiation of Human Induced Pluripotent Stem Cells**

Jeong Hyun You, Na Yeon Kim, Hyung Woo Choi, and Bong Geun Chung

(Sogang University)

**TS07W\_BP\_21**

**Droplet Microfluidic Device for Continuous Detection of Microparticles**

Ji Woo Jeon, Ji Wook Choi, and Bong Geun Chung

*(Sogang University)*

**TS07W\_BP\_22**

**Development of a 3D Microfluidic Device for Mimicking Cerebral Arteries**

Hyelim Kim, Jiyoung Song, Kyeongseob Hwang, Youngseon Cho, and Hongnam Kim

*(KIST)*

**TS07W\_BP\_23**

**Real-Time Signal Analysis with Broader Dynamic Range and Enhanced Sensitivity in Multiplex Colorimetric Immunoassay using Encoded Hydrogel Microparticles**

Yong Jun Lim, Jun Hee Choi, Seok Joon Mun, Jiwoo Ki, and Ki Wan Bong

*(Korea University)*

**TS07W\_BP\_24**

**Optimization of Particle Washing in Post-synthesis Functionalization Process to Enhance Sensitivity of Encoded Hydrogel-Based Immunoassay**

Su Hyeon Bae, Wookyoung Jang, Jun Hee Choi, Seok Joon Mun, and Ki Wan Bong

*(Korea University)*

**TS07W\_BP\_25**

**Highly Specific Multiplex Detection of SNPs using Encoded Hydrogel Microparticles with Universal Mismatch-Incorporated DNA Probes**

Hyun June Moon, Seok Joon Mun, Jun Ho Lee, Yoon Ho Roh, Yong Jun Lim, Jiwoo Kim, and Ki Wan Bong

*(Korea University)*

## [TS07] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS07T\_BP\_1

#### Development of Cell-Derived Extracellular Matrix (CD-ECM) Bioink for Tissue Regeneration

Utami Siwi Setya<sup>1,2</sup>, Yeong-Jin Choi<sup>2</sup>, and Hui-Suk Yun<sup>1,2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIMS)

### TS07T\_BP\_2

#### Single-Walled Carbon Nanotube Nanocarrier for Genetic Materials Delivery as a Microspore Engineering Tool

Hyuna Kwak<sup>1</sup>, Hyun Soo Kwon<sup>1</sup>, Hye Won Beak<sup>1</sup>, Min Jeong Lee<sup>1</sup>, Woo Jin Jeong<sup>1</sup>, Byung Cheol Kang<sup>1</sup>, Eun Young Yang<sup>2</sup>, Jin Hee Kim<sup>2</sup>, Hyeran Kim<sup>3</sup>, and Seonyeong Kwak<sup>1</sup>

(<sup>1</sup>Seoul National University, <sup>2</sup>National Institute Horticultural and Herbal Science, <sup>3</sup>Kangwon National University)

### TS07T\_BP\_3

#### Cell-Interfacing Lipid Nanotablet for Cell Membrane Protein Analysis

So Young Choi, Young Suk Yu, Eunhye Park, Sunge Hee Baek, and Jwa-Min Nam

(Seoul National University)

### TS07T\_BP\_4

#### A Novel Scandium-Doped Aluminum Nitride System for Enhanced Measurement of Muscle Tissue Contractility

Byunggik Kim<sup>1</sup>, Youngll Kim<sup>2</sup>, Sungmin Hong<sup>2</sup>, and Deok-Ho Kim<sup>1</sup>

(<sup>1</sup>Johns Hopkins University, <sup>2</sup>KETI)

### TS07T\_BP\_5

#### Visible Light-Induced ConA Binding Au/ZnO Bimetallic Nanoparticles with Enhanced Antibacterial Properties

Khongorzul Enkhtaivan<sup>1</sup>, Jang Jaehee<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark-Jefferson Buer Boyetey<sup>1</sup>, Gahyun Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, Jihyuk Yang<sup>1</sup>, Yonghyun Choi<sup>1,2</sup>, and Jonghoon Choi<sup>1,2</sup>

(<sup>1</sup>Chung-Ang University, <sup>2</sup>Feynman Institute of Technology)

### TS07T\_BP\_6

#### Highly Sensitive Encoded Hydrogel Microparticle-Based Multiplex Immunoassay using Tyramide Signal Amplification

Young Hee Kim, Jun Hee Choi, Yong Jun Lim, Jiwoo Kim, and Ki Wan Bong

(Korea University)



**TS07T\_BP\_7**

**Enhanced Fouling Resistance for Multiplex Immunoassays using Phosphorylcholine-Based Encoded Hydrogel Microparticles**

Yoon Ho Roh, Jiae Seo, Ju Yeon Kim, Hyeon Ung Kim, Seok Joon Mun, So Jung Oh, Ji-Hun Seo, and Ki Wan Bong

*(Korea University)*

**TS07T\_BP\_8**

**Immunotherapy and Photothermal Therapy using SNA/Man Conjugated Gold Nanorod (AuNR) on Pancreatic Cancer**

Hyejun Ko<sup>1</sup>, Jaehee Jang<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark-Jefferson Buer Boyetey<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Gahyun Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Jihyuk Yang<sup>1</sup>, Yerin Jang<sup>1</sup>, Younghyun Choi<sup>1,2</sup>, and Jonghoon Choi<sup>1,2</sup>

*(<sup>1</sup>Chung-Ang University, <sup>2</sup>Feynman Institute of Technology)*

**TS07T\_BP\_9**

**Ag/Cu/ZnO Tri-metal Nanoparticles Synthesis on Mesoporous Silica Nanoparticle for Enhanced Antibacterial Function and Safety**

Seongeun Park<sup>1</sup>, Yonghyun Choi<sup>1,2</sup>, Jaehee Jang<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark-Jefferson Buer Boyetey<sup>1</sup>, Gahyun Lee<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, Jihyuk Yang<sup>1</sup>, and Jonghoon Choi<sup>1,2</sup>

*(<sup>1</sup>Chung-Ang University, <sup>2</sup>Feynman Institute of Technology)*

**TS07T\_BP\_10**

**Engineering CD73 Antibody-Modified Oxygen Liposome for Reversal of Adenosine-Rich Tumor Microenvironment**

Yerin Jang<sup>1</sup>, Jaehee Jang<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark-Jefferson Buer Boyetey<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Gahyun Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Hyejun Ko<sup>1</sup>, Jihyuk Yang<sup>1</sup>, Yonghyun Choi<sup>1,2</sup>, and Jonghoon Choi<sup>1,2</sup>

*(<sup>1</sup>Chung-Ang University, <sup>2</sup>Feynman Institute of Technology)*

**TS07T\_BP\_11**

**Antibacterial Bicontinuous Zinc Oxide Nanostructure for Wound Infection Treatment**

Jiwon Kim<sup>1</sup>, Jaehee Jang<sup>1</sup>, Seongeun Park<sup>1</sup>, Gahyun Lee<sup>1</sup>, Mark-Jefferson Buer Boyetey<sup>1</sup>, Jihyuk Yang<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Yonghyun Choi<sup>1,2</sup>, Daeyeon Lee<sup>3</sup>, and Jonghoon Choi<sup>1,2</sup>

*(<sup>1</sup>Chung-Ang University, <sup>2</sup>Feynman Institute of Technology, <sup>3</sup>University of Pennsylvania)*

**TS07T\_BP\_12**

**Drug and Oxygen Co-Delivery to Tumor Micro-Environment through Targeted Oxygen Nanosomes**

Gahyun Lee<sup>1</sup>, Yonghyun Choi<sup>1,2</sup>, Jaehee Jang<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark-Jefferson Buer Boyetey<sup>1</sup>, Seongeun Park<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, Jihyuk Yang<sup>1</sup>, and Jonghoon Choi<sup>1,2</sup>

*(<sup>1</sup>Chung-Ang University, <sup>2</sup>Feynman Institute of Technology)*

### TS07T\_BP\_13

#### Development of Bimetal–Carbon Nanocomplex for Wound Healing Applications

Jaehee Jang<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark–Jefferson Buer Boyetey<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Gahyun Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Jihyuk Yang<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, Younghyun Choi<sup>1,2</sup>, and Jonghoon Choi<sup>1,2</sup>  
(<sup>1</sup>Chung–Ang University, <sup>2</sup>Feynman Institute of Technology)

### TS07T\_BP\_14

#### Development of Polyaniline/ Graphene Nanocomposite–Based Wearable pH Sensor

Seo Jin Kim<sup>1</sup>, Bong Gill Choi<sup>2</sup>, Kyoung G. Lee<sup>3</sup>, and Oh Seok Kwon<sup>1</sup>  
(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Kangwon National University, <sup>3</sup>NNFC)

### TS07T\_BP\_15

#### Real–Time Response Photonic Crystal Patch for Inflammation Recovery of Excisional Wound

Yonghoe Koo and Jinmyoung Joo  
(UNIST)

### TS07T\_BP\_16

#### Biodistribution Assessment of Radio–labeled Extracellular Vehicles Following Various Routes of Administration

Kyuwan Kim<sup>1</sup>, Ran Ji Yoo<sup>1,2</sup>, Changjin Lee<sup>3</sup>, Minseok Suh<sup>2</sup>, Kyo Chul Lee<sup>4</sup>, Yong Jin Lee<sup>4</sup>, Young Ju Kim<sup>1</sup>, Yun–Sang Lee<sup>1,2</sup>, Yong Song Gho<sup>5</sup>, and Dong Soo Lee<sup>1,5</sup>  
(<sup>1</sup>Seoul National University College of Medicine, <sup>2</sup>Seoul National University Hospital, <sup>3</sup>SL BIGEN. Co., Ltd., <sup>4</sup>KIRAMS, <sup>5</sup>POSTECH)

### TS07T\_BP\_17

#### Liposomal Nanocarrier with pH Sensitivity for Restoring the Tumor Vasculature and Transforming the Tumor Microenvironment via Oxygen Delivery

Mark–Jefferson Buer Boyetey<sup>1</sup>, Younghyun Choi<sup>1,2</sup>, Jiwon Kim<sup>1</sup>, Jaehee Jang<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Gahyun Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, Jihyuk Yang<sup>1</sup>, and Jonghoon Choi<sup>1,2</sup>  
(<sup>1</sup>Chung–Ang University, <sup>2</sup>Feynman Institute of Technology)

### TS07T\_BP\_18

#### PSA Lectin Conjugated PS and Silica Nanoparticles for Glycan Specific Pancreatic Cancer Targeting

Jihyuk Yang<sup>1</sup>, Yonghyun Choi<sup>1,2</sup>, Jaehee Jang<sup>1</sup>, Jiwon Kim<sup>1</sup>, Mark–Jefferson Buer Boyetey<sup>1</sup>, Gahyun Lee<sup>1</sup>, Seongeun Park<sup>1</sup>, Khongorzul Enkhtaivan<sup>1</sup>, Hyejun Ko<sup>1</sup>, Yerin Jang<sup>1</sup>, and Jonghoon Choi<sup>1,2</sup>  
(<sup>1</sup>Chung–Ang University, <sup>2</sup>Feynman Institute of Technology)

### TS07T\_BP\_19

#### Exploiting Porous Silicon Nanoparticle and HIF–2a Inhibitor for Inducing Immunogenic Cell Death in Merkel Cell Carcinoma

Juyoung Seong and Jinmyoung Joo  
(UNIST)

## [TS07] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS07T\_P\_1

#### Amplification-free Detection of Monkeypox Virus using Multiple crRNA Based Cas12a Biosensors

Hyowon Jang and Taejoon Kang

(KAIST)

### TS07T\_P\_2

#### Kirigami-Structured Stretchable Microsupercapacitors Array with MnO<sub>2</sub>/V<sub>2</sub>O<sub>5</sub> Nanocomposites

Seung Kyu Kim, Hee Uk Lee, and Bong Guen Chung

(Sogang University)

### TS07T\_P\_3

#### Development of an Integrated Device for Direct Microdroplet Generation

Daekyeong Jung, Donggee Rho, Yoomin Park, Namho Bae, Moonkeun Lee, Taejae Lee, Sukjae Lee, and Kyoung G. Lee

(NNFC)

### TS07T\_P\_4

#### Multifunctional Self-Priming Hairpin Probe-Based Isothermal Nucleic Acid Amplification for COVID-19 Diagnosis

Hansol Kim<sup>1,2</sup>, Hyun Gyu Park<sup>1</sup>, and Taejoon Kang<sup>2</sup>

(<sup>1</sup>KAIST, <sup>2</sup>KRIBB)

### TS07T\_P\_5

#### On-Site Pathogen Detection Enabled by Nanotopology for Managing Atopic Dermatitis

Jueun Kim<sup>1</sup>, Booseok Jeong<sup>2</sup>, Yoo Min Park<sup>3</sup>, Donggee Rho<sup>3</sup>, Seok Jae Lee<sup>3</sup>, Sung Gap Im<sup>2</sup>, Kyoung G. Lee<sup>3</sup>, and Bong Gill Choi<sup>1</sup>

(<sup>1</sup>Kangwon National University, <sup>2</sup>KAIST, <sup>3</sup>NNFC)

### TS07T\_P\_6

#### Evaluation of Size-Dependent Uptake and Cytotoxicity of Polystyrene Microplastic in a Blood-Brain Barrier (BBB) Mode

Yeonkseon Cho and Hong Nam Kim

(KIST)

### TS07T\_P\_7

#### **Fabrication of an Advanced Aging Model and Research on Aging Mechanisms through Induction of Aging in the Blood-brain Barrier (BBB)**

Eun U Seo<sup>1,2</sup> and Hong Nam Kim<sup>1,2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIST)

### TS07T\_P\_8

#### **Graphene Field-Effect Transistors for the Rapid Identification and Surveillance of Cyanobacterial Harmful Algal Blooms**

Jae Hyeon Kim and Oh Seok Kwon

(Sungkyunkwan University)

### TS07T\_P\_9

#### **Receptonics-Driven Approach for Rapid, Simultaneous Detection of Respiratory Virus Variants through Receptor-Ligand Dynamics**

Jung In Kim and Oh Seok Kwon

(Sungkyunkwan University)

### TS07T\_P\_10

#### **Ultrastable Biosensors based on Covalent Bond between N-Heterocyclic Carbene and Graphene Nanotransistor**

Kyung Ho Kim and Oh Seok Kwon

(Sungkyunkwan University)

### TS07T\_P\_11

#### **Reusable Electronic Tongue based on TRPV1 Based GFET through Ultra Stable Organic Chemistry for Pain Evaluation**

Sung Eun Seo and Oh Seok Kwon

(Sungkyunkwan University)

### TS07T\_P\_12

#### **In vitro 3D Unidirectional Cerebral Region Circuit Analytic Platform for Brain Inflammation**

Kyeong Seob Hwang<sup>1</sup>, Hyun Wook Kang<sup>1,3</sup>, Minjin Kan<sup>1</sup>, Nakwon Choi<sup>1</sup>, Jongbaeg Kim<sup>2</sup>, and Hong Nam Kim<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Yonsei University, <sup>3</sup>Korea University)

### TS07T\_P\_13

#### **Colorimetric Immunoassay via Precipitation in Hydrogel Particles for Prognosis Preeclampsia**

Yoon Ho Roh<sup>1</sup>, Hyun Jee Lee<sup>1</sup>, Ju Yeon Kim<sup>1</sup>, Hyeon Ung Kim<sup>1</sup>, Sun Min Kim<sup>2</sup>, Ji Won Byun<sup>1</sup>, and Ki Wan Bong<sup>1</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Seoul National University Borame Medical Center)

TS07T\_P\_14

**An Analysis of Colloidal Droplet Evaporation Behavior and Particle Aggregation on Porous Micropatterned Surfaces**

Yoo Joo Han, Woo Young Kim, Seok Kim, and Young Tae Cho

*(Changwon National University)*

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## [TS07] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS07F\_P\_1

#### Development of a Diagnostic Variable Number Tandem Repeat Marker and Dual TaqMan Genotyping Assay to Distinguish Lophophora Species

Eun-Mi Hwang, Kyu-Sik Jeong, Seong Yeon Yoo, and Joo-Young Kim  
(National Forensic Service)

### TS07F\_P\_2

#### Engineering a Biomimetic Blood-Brain-Barrier Model for Studying Drug Delivery using Injection-Molded Microfluidics

Jiyoung Song<sup>1</sup>, Noo Li Jeon<sup>2</sup>, and Hong Nam Kim<sup>1</sup>  
(<sup>1</sup>KIST, <sup>2</sup>Seoul National University)

### TS07F\_P\_3

#### Classification of Various Complex Gases using Genetically Engineered Functional Biosensor

Yujin Lee, Ye-Ji Kim, Tae-Young Jeong, and Jin-Woo Oh  
(Pusan National University)

### TS07F\_P\_4

#### Development of Pre-Treatment-Free Transition Metal-Based Colorimetric Sensor Array for Nitrate Nitrogen Detection

Jung-Geun Lee, Yujin Lee, Tae-Young Jeong, and Jin-Woo Oh  
(Pusan National University)

### TS07F\_P\_5

#### Sensitive Chiral Detection of Monosaccharides based on Surface-Enhanced Raman Spectroscopy

Daedu Lee and Yoonsoo Pang  
(GIST)

### TS07F\_P\_6

#### Multifunctional Nanoparticles based on Protoporphyrin and Iron Oxide Nanoparticles for Sonodynamic Therapy and Imaging

Seongpyo Hong, Hyunkyung Choi, Young Rang Uhm, and Gwang-Min Sun  
(KAERI)

**TS07F\_P\_7**

**Simple and Fast Wearable Stress Hormone Real-Time Monitoring**

Jai Eun An<sup>1,2</sup> and Oh Seok Kwon<sup>1</sup>

(<sup>1</sup>*Sungkyunkwan University*, <sup>2</sup>*KRIBB*)

**TS07F\_P\_8**

**Colorimetric Sensor based on Nanofiber Against Detection of  $\gamma$  Hydroxybutyrate**

Gyeong-Ji Kim and Oh Seok Kwon

(*Sungkyunkwan University*)

**TS07F\_P\_9**

**Development of Nanopillar Based Gold Electrode Sensor Capable of Measuring Tear Osmolarity**

Aram Bae<sup>1</sup>, Seong Han Pyo<sup>1</sup>, Jueun Kim<sup>2</sup>, Nam Ho Bae<sup>1</sup>, Bong Gill Choi<sup>2</sup>, and Kyoung G. Lee<sup>1</sup>

(<sup>1</sup>*NNFC*, <sup>2</sup>*Kangwon National University*)

**TS07F\_P\_10**

**Application of ddPCR Reader System for the Quantitative Analysis of RNA within IDH Tumors**

Ji Yun Han, Seong Han Pyo, Sung Hee Jo, and Kyoung G. Lee

(*NNFC*)

**TS07F\_P\_11**

**Hg Ion-Responsive Coalescence of Ag Nanoparticles on a Silica Structure for Surface-Enhanced Raman Scattering Sensing**

Bong-Hyun Jun

(*Konkuk University*)

**TS07F\_P\_12**

**Self-Assembly of Proteins into Size-Controllable Proteinosomes in an Emulsion Soft-Confined State**

Yanqiu Du<sup>1</sup>, Xuejie Liu<sup>1</sup>, Haidong Li<sup>1</sup>, Hongxu Chen<sup>1</sup>, and Soon Hyung Hong<sup>1,2</sup>

(<sup>1</sup>*Jiaying University*, <sup>2</sup>*KAIST*)

**TS07F\_P\_13**

**Investigating Fast and Highly Sensitive Diagnostic Techniques for Biofilms using CRISPR-Based Raman Spectroscopy**

Joo Hoon Lee, Jea Sung Ryu, Hyowon Jang, and Taejoon Kang

(*KRIBB*)

**TS07F\_P\_14**

**Investigating GR-HDAC Interactions through Cell-Based Sensor**

Neethu Ramakrishnan, Yeji Yu, and Youngeun Kwon

(*Dongguk University*)

### TS07F\_P\_15

#### **Live cell-Based Secretion Biosensor for the Detection of Glucocorticoids using Secretory Signal Peptide Reconstitution**

Keshab Lal Shrestha, Euiyeon Lee, Seonhye Kang, and Youngeun Kwon

*(Dongguk University)*

### TS07F\_P\_16

#### **Antioxidative and Anti-inflammatory Carbon Nanomedicine for the Therapy of Rheumatoid Arthritis**

Chanhee Choi, Hongwon Kim, Sin Lee, Yoonhee So, Yujin Choi, So-Hyun Moon, and Jong Ho Kim

*(Hanyang University)*

### TS07F\_P\_17

#### **Development of ddPCR System for POCT Diagnostics for miRNA Diagnosis**

SeongHan Pyo, JiYun Han, SungHee Jo, and Kyoung G. Lee

*(NNFC)*

### TS07F\_P\_18

#### **Removal of Unreacted Acrylate Double Bonds in the Hydrogel Microparticles Synthesized via Flow Lithography**

Hyun June Moon<sup>1</sup>, Minhee Ku<sup>2</sup>, Yoon Ho Roh<sup>1</sup>, Hyun Jee Lee<sup>1</sup>, Jaemoon Yang<sup>2</sup>, Hye Won Kim<sup>1</sup>, and Ki Wan Bong<sup>1</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>Yonsei University)*

### TS07F\_P\_19

#### **Detection of Multidrug-Resistant Bacteria based on CRISPR/Cas9n Mediated Hairpin Exponential Amplification**

Yeonkyung Park and Taejoon Kang

*(KRIBB)*

### TS07F\_P\_20

#### **Development of Magnetic Plasmonic Aptasensor for the Capture and Analysis of Extracellular Vesicles (EVs) in Early Cancer Diagnosis**

Jea Sung Ryu, Joo Hoon Lee, Hyowon Jang, Hyunju Kang, and Tae Joon Kang

*(KRIBB)*

### TS07F\_P\_21

#### **One-pot CRISPR/Cas13a and TtCsm6 Boosted Cascade Reaction of Hairpin Probe Enhanced Amplification-free Detection (HEAD) of SARS-CoV-2**

Pei Li, Hyowon Jang, Hansol Kim, and Taejoon Kang

*(KRIBB)*



TS07F\_P\_22

**Development of CRISPLAS Sensor Array for Ultra-Sensitive ctDNA Detection in Liquid Biopsy**

Hyunju Kang<sup>1,2</sup>, Yongwon Jung<sup>1</sup>, and Taejoon Kang<sup>2</sup>

(<sup>1</sup>KAIST, <sup>2</sup>KRIBB)

TS07F\_P\_23

**Multiplex Monitoring of Food Spoilage/Freshness by Wireless Portable Bioelectronic Nose**

Hafsa Huma and Oh Seok Kwon

(Sungkyunkwan University)

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# Technical Sessions

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## [TS08] Nanomaterials for Healthcare Devices

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### **Theme: Soft Healthcare Nanomaterials and Devices for In-Situ Monitoring and Medical Care**

Future healthcare relies heavily on personalized, remote, and real-time diagnostic and therapeutic solutions. Accordingly, there's an increasing focus on diverse nanomaterials and devices designed for continuous health monitoring, whether through internal or external attachments or integrations. This session aims to share advancements in nanomaterials, photonic materials, biomaterials, and thin-film electronics, along with their associated processing and device applications. It also includes extended research covering their biocompatibility, functionality, and reliability for translation into the industry.

[TS08W1]

Nanomaterials for Healthcare Devices 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 304
Session Chair(s)	Seung-Kyun Kang (Seoul Nat'l Univ.)

TS08W1_I_1	<b>*Invited</b>	09:00–09:30
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**Designer Self-Healing Materials for Bioelectronics**  
Jiheong Kang  
(KAIST)

TS08W1_O_2	09:30–09:45
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**Instantaneous Adhesive Cardiac Bioelectronics without Suturing**  
Yewon Kim and Donghee Son  
(Sungkyunkwan University)

TS08W1_O_3	09:45–10:00
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**Hydrogel-Based Adhesive Film for Versatile Electrical Interfacing in Soft Electronics**  
Yurim Lee, Yejin Jo, and Jungmok Seo  
(Yonsei University)

TS08W1_O_4	10:00–10:15
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**Polymeric Conductive Adhesive-Based Ultrathin Epidermal Electrodes for Long-Term Monitoring of Electrophysiological Signals**  
Joohwan Shin and Tae-il Kim  
(Sungkyunkwan University)

TS08W1_O_5	10:15–10:30
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**Patternable Self-Healing Polymer for Soft Electronics**  
Jaehoon Jung and Jiheong Kang  
(KAIST)

## [TS08W2]

### Nanomaterials for Healthcare Devices 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:40
Place	Room 304
Session Chair(s)	Hyojin Lee (KIST)

TS08W2_I_1	<b>*Invited</b>	15:40–16:10
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**Proteomimetic Polymers as Novel Therapeutics**

Nathan C. Gianneschi, Kendal Carrow, and Max Mu Wang  
*(Northwestern University)*

TS08W2_O_2	16:10–16:25
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**Dispersible Magnetic Nano-Electrodes for Ultrasensitive and Rapid Detection of Circulating Tumor DNA**

Jeong Ook Soh<sup>1</sup>, Young Keun Kim<sup>2</sup>, and Ju Hun Lee<sup>1</sup>  
*(<sup>1</sup>Hanyang University, <sup>2</sup>Korea University)*

TS08W2_I_3	<b>*Invited</b>	16:25–16:55
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**Soft, Resorbable Bioelectronics**

Suk-Won Hwang  
*(Korea University)*

TS08W2_O_4	16:55–17:10
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**Polyurethane/sodium Alginate Fiber Membrane Prepared by Conjugated Electrospinning for Sensing and Wound Dressing**

Wenyu Zhang, Yaning Lu, Yunchao Xiao, and Yang Jiang  
*(Jiaxing University)*

TS08W2_I_5	<b>*Invited</b>	17:10–17:40
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**Wearable Ultrasound Technology**

Sheng Xu  
*(University of California San Diego)*

[TS08T3]  
Nanomaterials for Healthcare Devices 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:15
Place	Room 304
Session Chair(s)	Hanwool Yeon (GIST)

TS08T3\_I\_1    **\*Invited**    09:00–09:30

Bio-Inspired Skin-Like Sensors for Healthcare Applications  
Hyunhyub Ko  
(UNIST)

TS08T3\_O\_2    09:30–09:45

Skin Functionalization using Nanomesh Electronics  
Jaehyun Kim and Jae Joon Lee  
(ETRI)

TS08T3\_O\_3    09:45–10:00

A Conformable Microneedle Sensor with Photopatternable Skin Adhesive and Gel Electrolyte for Continuous Glucose Monitoring  
Joohyuk Kang<sup>1,2</sup>, Seung-Kyun Kang<sup>1</sup>, and Wonryung Lee<sup>1</sup>  
(<sup>1</sup>Seoul National University, <sup>2</sup>KIST)

TS08T3\_O\_4    10:00–10:15

Photo-Patternable and Chemically Interlocked Tough Interface for Stretchable Bioelectronics  
Seungyeon Lee<sup>1</sup>, Donggyun Lee<sup>2</sup>, Yuri Lee<sup>1</sup>, Jooyeun Chong<sup>1</sup>, and Jiheong Kang<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>Seoul National University)

**[TS08T4]****Nanomaterials for Healthcare Devices 4**

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 14:00-15:30
<b>Place</b>	Room 304
<b>Session Chair(s)</b>	Soong Ju Oh (Korea Univ.)

**TS08T4\_I\_1 \*Invited 14:00-14:30****High-Throughput and Dynamic Biochip Systems for Tissue Engineering and Organs-on-a-Chip**

Junmin Lee

*(POSTECH)***TS08T4\_O\_2 14:30-14:45****Solid Solution Mg-3Zn Alloy Thin Film Electrode for Bio-Medical Electronics Applications**Ji-Woo Gu<sup>1</sup>, Guangzhe Li<sup>2</sup>, Yu-Chan Kim<sup>2</sup>, and Seung-Kyun Kang<sup>1</sup>*(<sup>1</sup>Seoul National University, <sup>2</sup>KIST)***TS08T4\_O\_3 14:45-15:00****3D Printed Polyanhydride Encapsulation for Bioresorbable Implant Devices**

Daeun Sung, Yerim Lee, Seunghun Han, Minki Hong, and Jahyun Koo

*(Korea University)***TS08T4\_O\_4 15:00-15:15****Nanoscale Crack-Induced Ultrasensitive Piezoresistive Sensor for Monitoring of Hemodynamics**Jae-Hwan Lee<sup>1</sup>, Yoon-Nam Kim<sup>1</sup>, Jun-Sang Lee<sup>2</sup>, and Seung-Kyun Kang<sup>1</sup>*(<sup>1</sup>Seoul National University, <sup>2</sup>Purdue University)***TS08T4\_O\_5 15:15-15:30****Bioelectronics using Ion Transport for Enhanced Precision Medicine**Sung-Geun Choi<sup>1</sup>, Seongchan Kim<sup>2</sup>, Hyojin Lee<sup>1</sup>, and Seung-Kyun Kang<sup>3</sup>*(<sup>1</sup>KIST, <sup>2</sup>Gyeongsang National University, <sup>3</sup>Seoul National University)*

### [TS08T5]

#### Nanomaterials for Healthcare Devices 5

Date & Time	July 4(Thu.), 2024 / 15:40–17:40
Place	Room 304
Session Chair(s)	Ju Hun Lee (Hanyang Univ.)

#### TS08T5\_I\_1 \*Invited 15:40–16:10

##### Triboelectric Energy Harvesting for Biomedical Applications

Sang-Woo Kim

(Yonsei University)

#### TS08T5\_I\_2 \*Invited 16:10–16:40

##### Ultrathin Organic Electronics for Healthcare Devices

Kenjiro Fukuda<sup>1</sup> and Takao Someya<sup>1,2</sup>

(<sup>1</sup>RIKEN, <sup>2</sup>The University of Tokyo)

#### TS08T5\_O\_3 16:40–16:55

##### 3D Printed Biodegradable Hydrogel Nerve Conduits for Peripheral Nerve Regeneration

Yerim Lee, Woo-Youl Maeng, Kyung Su Kim, Daeun Sung, and Jahyun Koo

(Korea University)

#### TS08T5\_O\_4 16:55–17:10

##### Stealthy Neural Recorder for Studying Naturalistic Behaviour in Primates

Saehyuck Oh, Janghwan Jekal, and Kyung-In Jang

(DGIST)

#### TS08T5\_O\_5 17:10–17:25

##### Adhesive-Free Hydrogel Bioelectronics Enabled by a Template-Directed Assembly of a Nanofibrous Network

Jooyeun Chong and Jiheong Kang

(KAIST)

#### TS08T5\_O\_6 17:25–17:40

##### Wireless and Suture-Type Strain Sensing System for Postoperative Assessment based on Au Nanoparticles-Incorporated Fiber Electrode

Mugeun Lee, Hwajoong Kim, Jinho Kim, and Jaehong Lee

(DGIST)



# [TS08] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

## TS08W\_BP\_1

### Ion Transport Accelerated Particle Incorporated Composite Actuator for Soft Robotics

Minjeong Kim, So Young Kim, Hanbin Choi, and Do Hwan Kim

(*Hanyang University*)

## TS08W\_BP\_2

### Mechanotransduction via Piezo-Driven Ion Declustering Dynamics for Innocuous Wireless Biosignal Monitoring Platform

Jihong Kim<sup>1</sup>, Haerim Kim<sup>2</sup>, Won Hyuk Choi<sup>1</sup>, Seungyoung Ahn<sup>2</sup>, and Do Hwan Kim<sup>1</sup>

(<sup>1</sup>*Hanyang University*, <sup>2</sup>*KAIST*)

## TS08W\_BP\_3

### Synthesis of Au-Based Nanoparticles through Chemical Transformation

Heesoo Jeong, Yun Jae Hwang, Boeun An, and Don-Hyung Ha

(*Chung-Ang University*)

## TS08W\_BP\_4

### Flexible Sensor with Multi-Taste Capability for Flavor Analysis via Deep Learning

Junwoo Yea<sup>1</sup>, Han Hee Jung<sup>2</sup>, Hyunjong Lee<sup>1</sup>, Jeongho Kwak<sup>1</sup>, Jihwan P. Choi<sup>3</sup>, and Kyung-In Jang<sup>1</sup>

(<sup>1</sup>*DGIST*, <sup>2</sup>*Hannam University*, <sup>3</sup>*KAIST*)

## TS08W\_BP\_5

### Anti-Temperature Interference Strain Sensing Layer based on Metal Nanoparticles by Optimized Hybrid Ligand Exchange

Young Kyun Choi<sup>1</sup>, Taesung Park<sup>1</sup>, Dong Hyun David Lee<sup>2</sup>, Junhyuk Ahn<sup>1</sup>, Yong Hwan Kim<sup>1</sup>, Sanghyun Jeon<sup>1</sup>, Myung Joon Han<sup>2</sup>, and Soong Ju Oh<sup>1</sup>

(<sup>1</sup>*Korea University*, <sup>2</sup>*KAIST*)

## TS08W\_BP\_6

### Flexible Neural Probe with 3D Nanoporous Microelectrodes for Deep Brain Decoding in Non-Human Primates

Janghwan Jekal, Saehyuck Oh, and Kyung-In Jang

(*DGIST*)

### TS08W\_BP\_7

#### **Wearable Multimodal Haptic System based on Ultra Light-Weight Textiles**

Jinhee Hwang, Sun Hong Kim, and Yei Hwan Jung

*(Hanyang University)*

### TS08W\_BP\_8

#### **In-Depth Investigations on Synergistic Composition of Solution-Derived Quaternary Oxide Dielectrics for Enhanced Thin-Film Transistors**

Seokhyeon Baek<sup>1</sup>, Jun-Gyu Choi<sup>2</sup>, and Sungjun Park<sup>1</sup>

*(<sup>1</sup>Ajou University, <sup>2</sup>GIST)*

### TS08W\_BP\_9

#### **Kinetically Controlled Morphology and Composition of Colloidal Nanoparticles: Cation Exchange Reactions from Copper Sulfide to Transition Metal (Mn, Zn, Co, and Fe) Sulfides**

Boeun An, Heesoo Joeng, and Don-Hyung Ha

*(Chung-Ang University)*

### TS08W\_BP\_10

#### **Selective Patterning of Sol-Gel-Derived Oxide Semiconductors for Partially Overlapped Heterojunction Transistor**

Jun-Gyu Choi, Seokhyeon Baek, and Sungjun Park

*(Ajou University)*

### TS08W\_BP\_12

#### **High-Performance Ultra-Flexible Organic Photovoltaic using Stretchable PDMS Nanopillar**

Jae-Hyun Ki<sup>1</sup>, Byoungwook Park<sup>2</sup>, Seulki Song<sup>3</sup>, Junyong Ahn<sup>4</sup>, Jaebin Jeong<sup>1</sup>, Sang-Hyeon Nam<sup>5</sup>, Seung-Hoon Lee<sup>6</sup>, Junyong Park<sup>4</sup>, and Sungjun Park<sup>1</sup>

*(<sup>1</sup>Ajou University, <sup>2</sup>KRICT, <sup>3</sup>Chungnam National University, <sup>4</sup>Kumoh National Institute of Technology, <sup>5</sup>KAIST, <sup>6</sup>Kongju National University)*

### TS08W\_BP\_13

#### **Miniaturized Biosensors using Organic Electrochemical Transistors on Microfibers**

Jonghyun Won, Inho Lee, Hyeongbeom Lee, and Sungjun Park

*(Ajou University)*

### TS08W\_BP\_14

#### **3D-Multilayered Organic Photodiode for Selective Light Sensing**

Jaebin Jeong, Jae-Hyun Kim, and Sungjun Park

*(Ajou University)*

**TS08W\_BP\_15**

**High-Amplification, Ultra-Flexible Organic Electrochemical Transistors for Skin-Interfaced Sensors**

Inho Lee, Hyeongbeom Lee, Jonghyun Won, and Sungjun Park

*(Ajou University)*

**TS08W\_BP\_16**

**Ultra-Conductive Fibers with Durability and Waterproof Properties for Bio-Signal Monitoring Systems**

Hansu Kim, Taeyeon Oh, Hyeongbeom Lee, Inho Lee, and Sungjun Park

*(Ajou University)*

**TS08W\_BP\_17**

**Biodegradable Multi-Dyad Encapsulation for Transient Electronics**

Hyeonji Yoo<sup>1</sup>, Gyeong-Seok Hwang<sup>1</sup>, Jae-Hwan Lee<sup>2</sup>, Seung-Kyun Kang<sup>2</sup>, and Ju-Young Kim<sup>1</sup>

*(<sup>1</sup>UNIST, <sup>2</sup>Seoul National University)*

**TS08W\_BP\_18**

**Nano-Fabrication of Inorganic Stretchable Encapsulation for Stretchable Organic Solar Cells**

Ji-Hyeon Jo, Hyeonji Yoo, Gyeong-Seok Hwang, and Ju-Young Kim

*(UNIST)*

**TS08W\_BP\_19**

**Laser-Based Photothermal Processing of Stretchable Nanocomposite for Fully Stretchable Multilayer Circuit**

Sangmin Son<sup>1,2</sup>, Wonryung Lee<sup>1</sup>, Seung Hwan Ko<sup>2</sup>, and Hojeong Jeon<sup>1</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Seoul National University)*

**TS08W\_BP\_20**

**Stretchable, Self-Healing Conductors for Bioresorbable, Transient Electronic Systems**

Tae-Min Jang<sup>1</sup>, Won Bae Han<sup>1,2</sup>, and Suk-Won Hwang<sup>1,3</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>Georgia Institute of Technology, <sup>3</sup>KIST)*

**TS08W\_BP\_21**

**Membrane-Assisted Fabrication of Multilayer Biodegradable Polymer Microneedles with Reliable Drug Delivery**

Ha Young Choi<sup>1,2</sup>, Sangmin Song<sup>1</sup>, Hojeong Jeon<sup>1</sup>, Honggu Chun<sup>2</sup>, and Myoung-Ryul Ok<sup>1,3</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Korea University, <sup>3</sup>UST)*

**TS08W\_BP\_22**

**Bioresorbable, Wireless, System for Electrotherapy at Wound Sites**

Daniel Tiruneh and Hanjun Ryu

*(Chung-Ang University)*

### TS08W\_BP\_23

#### **A Scalable and Sustainable Transfer Printing using Self-Assembled Monolayers for Mass Production of Nano-Scale Electronics**

Seung-Min Lee, Woo-Jin Lee, Jae-Young Bae, Ji-Woo Gu, and Seung-Kyun Kang

*(Seoul National University)*

### TS08W\_BP\_24

#### **Defining Roles of the Cathodic Phase on the Binary Mg Alloys for the Generation Behavior of Reactive Oxygen Species**

Minjung Chae<sup>1,2</sup>, Goeen Jeon<sup>1,2</sup>, Guangzhe Li<sup>1</sup>, Hojeong Jeo<sup>1,3,4</sup>, Yu-Chan Kim<sup>1,3</sup>, Seung-Kyun Kang<sup>2</sup>, Ho Won Jang<sup>2</sup>, and Myoung-Ryul Ok<sup>1,3</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Seoul National University, <sup>3</sup>UST-KIST, <sup>4</sup>Korea University)*

### TS08W\_BP\_25

#### **Bioresorbable Material-Based Negatively Responsive Strain Sensing Suture for Continuous Health Monitoring**

Jinho Kim and Jaehong Lee

*(DGIST)*

## [TS08] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS08T\_BP\_1

#### Tri-Achiral Buckling Sensors for Continuous Monitoring of Pressure and Shear Forces via Convolutional Neural Networks

Yoorim Loh<sup>1</sup>, Younghan Kim<sup>1</sup>, Dongjin Lee<sup>1</sup>, Sangwon Kim<sup>1</sup>, Namhyeong Lee<sup>1</sup>, Seongju Lee<sup>1</sup>, Hakyong Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho<sup>2</sup>, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_2

#### Real-Time Visualization of Multiple Signals Collected from Wireless Sensors in Virtual Environments

Hakyong Lee<sup>1</sup>, Seongju Lee<sup>1</sup>, Yoorim Loh<sup>1</sup>, Sangwon Kim<sup>1</sup>, Namhyeong Lee<sup>1</sup>, Younghan Kim<sup>1</sup>, Dongjin Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho<sup>2</sup>, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_3

#### Development of Core Technology for Ultra-Miniaturized Multimodal Sensor based on Cantilever Beam

Nam Hyeong Lee<sup>1</sup>, Dong Jin Lee<sup>1</sup>, Sangwon Kim<sup>1</sup>, Younghan Kim<sup>1</sup>, Yoorim Loh<sup>1</sup>, Seongju Lee<sup>1</sup>, Hakyong Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho<sup>2</sup>, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_4

#### Wireless, Battery-Free Optoelectronic Pressure Sensor based on a Thin and Porous Film

Sang Won Kim<sup>1</sup>, Dongjin Lee<sup>1</sup>, Younghan Kim<sup>1</sup>, Namhyeong Lee<sup>1</sup>, Yoorim Loh<sup>1</sup>, Seongju Lee<sup>1</sup>, Hakyong Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho<sup>2</sup>, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_5

#### Battery-Free, Wireless Optoelectronic Sensor for Measuring Hydration using a Thin, Patterned Hydrogel Film

Seongju Lee<sup>1</sup>, Younghan Kim<sup>1</sup>, Yoorim Loh<sup>1</sup>, Dongjin Lee<sup>1</sup>, Sangwon Kim<sup>1</sup>, Namhyeong Lee<sup>1</sup>, Hakyong Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho<sup>2</sup>, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_6

#### **Closed-Loop System based on Wireless Sensor and Robotic Bed for Pressure Relief**

Dong Jin Lee<sup>1</sup>, Nam Hyeong Lee<sup>1</sup>, Sangwon Kim<sup>1</sup>, Younghan Kim<sup>1</sup>, Yoorim Loh<sup>1</sup>, Seongju Lee<sup>1</sup>, Hagyoung Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_7

#### **Fully Integrated Wireless Neural Recorder for Studying Instinctive Behaviours in Primates**

Saehyuck Oh, Janghwan Jekal, and Kyung-In Jang

(DGIST)

### TS08T\_BP\_8

#### **Development of a Shear Sensor Utilizing Mechanical Deformation of Serpentine Structure**

Younghan Kim<sup>1</sup>, Yoorim Loh<sup>1</sup>, Dongjin Lee<sup>1</sup>, Sang Won Kim<sup>1</sup>, Nam Hyeong Lee<sup>1</sup>, Seongju Lee<sup>1</sup>, Hagyoung Lee<sup>1</sup>, Hyeonseok Han<sup>2</sup>, Seokjoo Cho<sup>2</sup>, Inkyu Park<sup>2</sup>, and Yong Suk Oh<sup>1</sup>

(<sup>1</sup>Changwon National University, <sup>2</sup>KAIST)

### TS08T\_BP\_9

#### **Scalable Crack-Based Strain Sensor Array on Skin Adhesives with Cost-Effective Metals**

Chaeyoung Kang<sup>1</sup>, Hyoungyoun Lee<sup>2</sup>, and Hanwool Yeon<sup>1</sup>

(<sup>1</sup>GIST, <sup>2</sup>Chonnam National University)

### TS08T\_BP\_10

#### **A Breathable and Stretchable Temperature Sensor using Partially Reduced Graphene Oxide and Mesh-Shaped Textile Substrate for Human Health Monitoring**

Hyun Jin Kang and Jung Woo Lee

(Pusan National University)

### TS08T\_BP\_11

#### **Cyclic Mechanical Stimulus Regulates Mechanotransduction of Smooth- and Skeletal-Muscle Cells**

Geon-Woo Kim and Junmin Lee

(POSTECH)

### TS08T\_BP\_12

#### **Fabrication of Layer Engineered MXene Based Resistance Pressure Sensors for Healthcare Monitoring**

Jeong Eun Byun<sup>1</sup>, Debananda Mohapatra<sup>2</sup>, Soo-Hyun Kim<sup>2</sup>, and Jung Woo Lee<sup>1</sup>

(<sup>1</sup>Pusan National University, <sup>2</sup>UNIST)

**TS08T\_BP\_13**

**Enhancing Plant Physiology Monitoring with Hydrogel Microneedle-Based Electrodes**

Geonho Lee and Junmin Lee

*(POSTECH)*

**TS08T\_BP\_14**

**Nucleic Acid Detection with Single-Base Specificity Integrating Isothermal Amplification with Light-Up Aptamer Probes**

Jaekyun Baek and Youngeun Kim

*(Seoul National University)*

**TS08T\_BP\_15**

**Rapid, Multiplexable Nucleic Acid-Based Paper Sensors (Building Easy-to-use DNA Paper Sensors for Encoding/Decoding Information)**

HyunBin Lee and Youngeun Kim

*(Seoul National University)*

**TS08T\_BP\_16**

**Ion Transport Promoter for Wearable Applications of Stretchable Poly(Ionic Liquid)-Based Organic Synaptic Transistors**

Seung-Woo Lee, Kwan-Nyeong Kim, and Tae-Woo Lee

*(Seoul National University)*

**TS08T\_BP\_17**

**Biodegradable Magnesium Coatings for Promoting Nerve Regeneration in Healthcare Applications**

Hyewon Kim<sup>1,2</sup>, Hyeok Kim<sup>1</sup>, Sunhee Lee<sup>1</sup>, Ji-Young Lee<sup>1,3</sup>, Seongchan Kim<sup>1</sup>, Hyojin Lee<sup>1</sup>, Hojeong Jeon<sup>1,2</sup>, Myoung-Ryul OK<sup>1,3</sup>, Hyung-Seop Han<sup>1</sup>, Seok Chung<sup>2</sup>, and Yu-Chan Kim<sup>1,3</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Korea University, <sup>3</sup>UST)*

**TS08T\_BP\_18**

**Lubricant-Infused Organic Multilayer Encapsulations for Implantable Bioelectronic Devices**

Sangwoo Park, Kijun Park, and Jungmok Seo

*(Yonsei University)*

## [TS08] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS08F\_P\_1

#### **Fully Implantable Iontophoresis System for Enhancement of Drug Efficacy**

Sung-Geun Choi<sup>1</sup>, Seongchan Kim<sup>2</sup>, Hyojin Lee<sup>1</sup>, and Seung-Kyun Kang<sup>3</sup>

(<sup>1</sup>KIST, <sup>2</sup>Gyeongsang National University, <sup>3</sup>Seoul National University)

### TS08F\_P\_2

#### **Aptamer Conjugated Brain-Mimetic Liposome Containing Doxorubicin for Glioblastoma Therapy**

Myeongsun Kim<sup>1</sup> and Hyojin Lee<sup>2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIST)

### TS08F\_P\_3

#### **Computer-Aided Design and Embroidery-Enabled Textile-Based Wearable Wireless Communication System for Body Sensors**

Junyeong Lee and Jaehong Lee

(DGIST)

### TS08F\_P\_4

#### **EMG Sensing System Integrated with Textiles for Enhanced Electromyographic Interaction**

Hwajoong Kim and Jaehong Lee

(DGIST)

### TS08F\_P\_5

#### **Biodegradable and Stretchable Metallic Glass for Biomedical Applications**

Jae-Young Bae and Seung-Kyun Ka

(Seoul National University)

### TS08F\_P\_6

#### **Biodegradable Conductive Polymer Composites with Enhanced Stretchability for Sustainable Soft Electronics**

Kyung-Sub Kim and Seung-Kyun Kang

(Seoul National University)



#### TS08F\_P\_7

##### **Dual-Stimuli-Responsive and Anti-freezing Conductive Ionic Hydrogels for Smart Wearable Devices and Optical Display Device**

Yi Li, Dongmei Lei, Yunchao Xiao, and Yang Jiang

*(Jiaxing University)*

#### TS08F\_P\_8

##### **Development of an Amperometric Acetylcholine Biosensor**

Jieun Son and Kyung-In Jang

*(DGIST)*

#### TS08F\_P\_9

##### **Double-Sided Structure of Flexible Neural Probe for Enhanced Dopamine Monitoring in Neurological Disorders**

Jeongdae Ha<sup>1</sup>, Han Hee Jung<sup>2</sup>, and Kyung-In Jang<sup>1</sup>

*(<sup>1</sup>DGIST, <sup>2</sup>Hannam University)*

#### TS08F\_P\_10

##### **M13 Bacteriophage-Based Scaffold Providing Piezoelectric Signal**

Sang Min Lee and Ju Hun Lee

*(Hanyang University)*

#### TS08F\_P\_11

##### **Development of Thermo-Pneumatic Peristaltic Drug Delivery Device for Pharmaceutical Deep Brain Stimulation**

Hyeokjun Lee and Kyung-In Jan

*(DGIST)*

#### TS08F\_P\_12

##### **Patterning of Cesium Lead Halide Perovskite via Photolithography Compatible All-Solution Method for Optoelectronic Applications**

Woosik Kim<sup>1</sup>, Su-Kyung Kim<sup>1</sup>, Sanghyun Jeon<sup>1</sup>, Junhyuk Ahn<sup>1</sup>, Byung Ku Jung<sup>1</sup>, Sang Yeop Lee<sup>1</sup>, Tae-Yeon Seong<sup>1</sup>, Sohee Jeong<sup>2</sup>, Ho Seong Jang<sup>2</sup>, and Soong Ju Oh<sup>1</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KAIST)*

#### TS08F\_P\_13

##### **Manipulating Solvent Ratio of the Precursors to Achieve Enhanced Photocurrent of 2D-Perovskite Photoconductor**

Hanseok Seo, Junhyeok Park, Byung Ku Jung, Young Kyun Choi, Taesung Park, Woosik Kim, and Soong Ju Oh

*(Korea University)*

### TS08F\_P\_14

#### Neuroprotective Drug-Loaded pH Sensitive Porous Silica Nanoparticles (PSNs) for Therapy

Sian Lee<sup>1,2</sup>, Ga-Been Kim<sup>1,2</sup>, and Hyojin Lee<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea University)

### TS08F\_P\_15

#### Sub-1V Ultra-Low Power Neuromorphic Thin Film Transistors by Behaviors of Ion

Yoonseok Song, Jun-Gyu Choi, and Sungjun Park

(Ajou University)

### TS08F\_P\_16

#### High Density Array Integration Laser-cut Vertical-via Hole OECTs

Hyeongbeom Lee, Inho Lee, Jonghyun Won, and Sungjun Park

(Ajou University)

### TS08F\_P\_17

#### Ultra-Stretchable Organic-Inorganic Hybrid Dry Electrodes for Skin Friendly Electrocardiogram Sensors

Taeyeon Oh, Hansu Kim, and Sungjun Park

(Ajou University)

### TS08F\_P\_18

#### High-Stretchable and Biocompatible Elastomers for Soft, Transient Electronics

So Jeong Choi<sup>1</sup>, Won Bae Han<sup>1,2</sup>, Gwan-Jin Ko<sup>1</sup>, and Suk-Won Hwang<sup>1,3</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Georgia Institute of Technology, <sup>3</sup>KIST)

### TS08F\_P\_19

#### Biodegradable Transparent Conductive Electrode for Transient Display

Sehun Kang, Juyong Lee, Joohyeon Park, Sunggeun Choi, Sangho Oh, Youngchang Joo, and Seungkyun Kang

(Seoul National University)

### TS08F\_P\_20

#### Bioelectric Face Masks for Wearable Cortisol Sensor using Permeable Nanomesh

Sungjoon Cho and Taeyoon Lee

(Yonsei University)

### TS08F\_P\_21

#### Inorganic Nanosheets Based Colorimetric Biosensor via Enhancement of Sensitivity for Healthcare Monitoring

Yunkyeong Cho<sup>1,2</sup>, Jahyun Koo<sup>2</sup>, and Hyojin Lee<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea University)

# Technical Sessions

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## **[TS09] Nanomedicine**

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### **Theme: Tailoring Nanomedicine for Your Health**

Nanomedicine offers numerous possibilities for groundbreaking developments in various fields, including biotechnology and medicine. In this session, we will introduce recent outstanding research on the synthesis and characteristics of nanomaterials and explore how these nanomaterials are applied in the fields of biotechnology and medicine. This session provides an opportunity for researchers in the fields of nanomaterials, biotechnology, and medicine to gather together to review and exchange opinions on the development and prospects of the fields of nanobiotechnology and nanomedicine.

[TS09W1]

Nanomedicine 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 305
Session Chair(s)	Hyun Jong Lee (Gachon Univ.)

TS09W1\_O\_109:00–09:15

Hyperbranched Polyglycerol-Coated Anti-Biofouling Mesoporous Organosilica Nanoparticles for Cancer Therapy

Gyeongseok Yang, Eunshil Choi, and Ja-Hyoung Ryu

(UNIST)

TS09W1\_O\_209:15–09:30

Advanced Osteoarthritis Therapy with Nitric Oxide-Scavenging Hyaluronic Acid Nanoparticles

Yunyoung Nah<sup>1</sup> and Won Jong Kim<sup>1,2</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)

TS09W1\_I\_3\*Invited09:30–10:00

Self-Adjusting Peptide-Based Carrier for mRNA Delivery in Nanotube Structure with High Thermodynamic Stability

Jun Shik Choi

(KIRAMS)

TS09W1\_I\_4\*Invited10:00–10:30

Concatemeric DNA-Assisted Metal Nanoclusters for Cancer Immunotherapy

Gayong Shim

(Soongsil University)

**[TS09W2]****Nanomedicine 2**

<b>Date &amp; Time</b>	July 3(Wed.), 2024 / 15:40-17:25
<b>Place</b>	Room 305
<b>Session Chair(s)</b>	Yoo Kyung Kang (Gyeongsang Nat'l Univ.)

<b>TS09W2_I_1</b>	<b>*Invited</b>	<b>15:40-16:10</b>
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**Plant-Derived Nanovesicles: Revolutionizing Osteoporosis Prevention**

Young-Eun Cho

*(Andong National University)*

<b>TS09W2_I_2</b>	<b>*Invited</b>	<b>16:10-16:40</b>
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**Development of a Subcutaneously Injectable Bispecific T Cell Engager Loaded Thermosensitive Sustained Release Hydrogel to Construct and Proliferate Tumor-Specific T Cells In Vivo**

Kuo-Hsiang Chuang

*(Taipei Medical University)*

<b>TS09W2_I_3</b>	<b>*Invited</b>	<b>16:40-17:10</b>
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**An Injectable Hydrogel for Locoregional Anticancer Immunotherapy**

Jihoon Kim

*(Chung-Ang University)*

<b>TS09W2_O_4</b>	<b>17:10-17:25</b>
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**Multi-Sensitive Antibody Production and Releasing Platform for Anti Cancer Immunotherapy**

Mihyeon Park and Won Jong Kim

*(POSTECH)*

### [TS09T3]

#### Nanomedicine 3

Date & Time	July 4(Thu.), 2024 / 09:30–10:30
Place	Room 305
Session Chair(s)	Jihoon Kim (Chung-Ang Univ.)

##### TS09T3\_O\_1

09:30–09:45

#### Development of Glutamate-Urea-Lysine Conjugated Albumin/fluorescence Complex for Targeting Prostate-specific Membrane Antigen Positive Prostate Cancer

Yu Jin Chung<sup>1</sup>, Ji Yoon Kim<sup>1</sup>, Jin Sil Kim<sup>2</sup>, Yu Jin Shin<sup>2</sup>, Jung Woo Byun<sup>1</sup>, Min Koun Kim<sup>2</sup>, Se Chan Oh<sup>2</sup>, Min Seok Suh<sup>2</sup>, Ji Yong Park<sup>1,2</sup>, Ran Ji Yoo<sup>2</sup>, Yong Jin Lee<sup>3</sup>, Kyo Chul Lee<sup>3</sup>, and Yun-Sang Lee<sup>1,2,4</sup>

(<sup>1</sup>Seoul National University College of Medicine, <sup>2</sup>Seoul National University Hospital, <sup>3</sup>KIRAMS, <sup>4</sup>Seoul National University)

##### TS09T3\_O\_2

09:45–10:00

#### Amplifying Glioblastoma Immunotherapy: T Cell Shielding through NO/ROS Scavenging Nanoparticles Potentiates anti-PD-1

Jihye Lee and Won Jong Kim

(POSTECH)

##### TS09T3\_I\_3 \*Invited

10:00–10:30

#### Polysaccharide-Based Cancer Vaccine Strategies for Precision Cancer Medicine

Sejin Son

(Inha University)

## [TS09T4]

### Nanomedicine 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:15
Place	Room 305
Session Chair(s)	Sejin Son (Inha Univ.)

TS09T4_I_1	<b>*Invited</b>	14:00–14:30
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**Engineering Strategies to Modulate the Gut Microbiome and Immune System**

James J. Moon

*(University of Michigan)*

TS09T4_I_2	<b>*Invited</b>	14:30–15:00
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**Bioengineering and Nanomedicine for Cancer Theranostics**Atsushi Yamashita, Kai Bao, Satoshi Kashiwagi, Homan Kang, and Hak Soo Cho<sup>1,2</sup>*(<sup>1</sup>Harvard Medical School, <sup>2</sup>Massachusetts General Hospital)*

TS09T4_O_3		15:00–15:15
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**Poly( $\beta$ -Amino Ester) Library for mRNA Delivery**Hong Lyun Kim<sup>1</sup> and Won Jong Kim<sup>1,2</sup>*(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)*

### [TS09T5]

#### Nanomedicine 5

Date & Time	July 4(Thu.), 2024 / 15:40–17:10
Place	Room 305
Session Chair(s)	Won Jong Kim (POSTECH)

##### TS09T5\_I\_1 \*Invited

15:40–16:10

##### Novel Core–Shell Design for Smart Polymeric Micelles

Nobuhiro Nishiyama<sup>1,2</sup>

(<sup>1</sup>Tokyo Institute of Technology, <sup>2</sup>Kawasaki Institute of Industrial Promotion)

##### TS09T5\_I\_2 \*Invited

16:10–16:40

##### Photoresponsive Nanomedicine for the Treatment of Cancer and Eye Diseases

Weiping Wang

(The University of Hong Kong)

##### TS09T5\_I\_3 \*Invited

16:40–17:10

##### Noninvasive Gut-to-Brain Oral Delivery Systems

Cam-Hoa Mac, Yang-Bao Miao, Kuan-Hung Chen, Khanh Nguyen, Nhien Nguyen, Giang Le Thi Nguyen, Dien Thi My Nguyen, Hsien-Meng Tai, Pei-Ju Chang, Yu-Jung Lin, and Hsing-Wen Sung

(National Tsing Hua University)



## [TS09] Poster Session 1 Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS09W\_BP\_2

#### Transcytosis Enhanced Delivery of Albumin Nanomedicines for High-Resolution Tumor Imaging and Therapy

Yeonju Boo<sup>1</sup>, Hyori Lee<sup>1</sup>, and Won Jong Kim<sup>1,2</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)

### TS09W\_BP\_3

#### Deep Brain Stimulation by Blood-Brain-Barrier-Crossing Piezoelectric Nanoparticles Generating Current and Nitric Oxide under Focused Ultrasound

Jihye Lee, Taejeong Kim, and Won Jong Kim

(POSTECH)

### TS09W\_BP\_4

#### Development of a Tumor Microenvironment (TME) Mimicking 3D In Vitro Coculture Platform Facilitating Differentiation of Normal Fibroblast into Cancer Associated Fibroblast (CAF)

Hyeon Song Lee<sup>1</sup>, Eun Ji Yeom<sup>1</sup>, Hwa Kyung Byun<sup>2</sup>, Woong Sub Koom<sup>2</sup>, and Won-Gun Koh<sup>1</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>Yonsei University College of Medicine)

### TS09W\_BP\_5

#### M1 Macrophages Induced PCL/PVP Blended Nanofibers-Based Microwells System for Immunotherapy of Breast Cancer

Juhwan Choi and Won-Gun Koh

(Yonsei University)

### TS09W\_BP\_6

#### A Transformable siRNA Nanomedicine via Spatially Controlled Disulfide Polymerization for Stable Packaging and Synergistic Therapy

Gaeun Park<sup>1</sup>, Sangpil Kim<sup>1</sup>, Yumi Cho<sup>1</sup>, Dohyun Kim<sup>1</sup>, Seung Hak Oh<sup>1</sup>, Eunshil Choi<sup>1</sup>, Sang Kyu Kwak<sup>2</sup>, and Ja-Hyoung Ryu<sup>1</sup>

(<sup>1</sup>UNIST, <sup>2</sup>Korea University)

### TS09W\_BP\_7

#### Triple Dumbbell Template-Mediated Exponential Amplification System with Structure-Specific Invasive Cleavage for Breast Cancer Diagnosis

Jueun Han, Khulan Nyamzaya, Yejin Song, Jihee Lee, and Eunjung Kim

(Incheon National University)

### TS09W\_BP\_8

#### **Molecular Diagnostic System for Early Detection of Peritoneal Fibrosis in Peritoneal Dialysis Patients**

Yejin Song, Jueun Han, Khulan Nyamzaya, Jihee Lee, and Eunjung Kim

*(Incheon National University)*

### TS09W\_BP\_9

#### **Innovative o-Phenylenediamine Derivatives as Nitric Oxide Scavengers for Rheumatoid Arthritis Therapy**

Sangmin Lee<sup>1</sup>, Yeong Mi Lee<sup>1</sup>, and Won Jong Kim<sup>1,2</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)*

### TS09W\_BP\_10

#### **Aloe-derived Extracellular Nanovesicles for Acute Colitis Treatment**

Sang-Hun Choi and Jihoon Kim

*(Chung-Ang University)*

### TS09W\_BP\_11

#### **Magnetic Nanoparticle-Based Multifunctional Porous Microspheres Loaded with Oncolytic Bacteria for Targeted Cancer Therapy**

Ga-Hyun Bae and Wooram Park

*(Sungkyunkwan University)*

### TS09W\_BP\_12

#### **High-Z Materials-Based Nanomedicine for Enhanced Cancer Radiotherapy**

Seungyong Shin and Wooram Park

*(Sungkyunkwan University)*

### TS09W\_BP\_13

#### **Improving the Delivery of Paclitaxel Drug via Silk Proteins to Target Ovarian Cancer**

Jaehoon Ko, Yoonho Hwang, Seonmin Choi, Hyeyoun Cho, and Jaehong Key

*(Yonsei University)*

### TS09W\_BP\_14

#### **Silk Protein-Based Drug Delivery System for Lung Cancer Treatment**

Hyeyoun Cho, Jaehoon Ko, Yoonho Hwang, Seonmin Choi, and Jaehong Key

*(Yonsei University)*

**TS09W\_BP\_15**

**Potential of AuNR@SiO<sub>2</sub> with a Tunable Silica Shell Thickness in Nanoscale for Immuno-Photothermal Therapeutics**

Wonseok Yang<sup>1</sup>, Wan Su Yun<sup>1</sup>, Yong Duk Kim<sup>1</sup>, Kwangmeyung Kim<sup>2</sup>, and Dong-Kwon Lim<sup>1,3</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Ewha Womans University, <sup>3</sup>KIST)

**TS09W\_BP\_16**

**Anisotropic Hybrid Hydrogel with Aligned Electrospun Fibrils for Directed Muscle Cell Growth**

Go Eun Bae, Seung Yeop Yoo, Min Jin Kim, and Hyun Jong Lee

(Gachon University)

**TS09W\_BP\_17**

**Partial VEGF Peptide as an Inhibitor of Angiogenesis**

Kevin Kent Vincent Canlas and Hansoo Park

(Chung-Ang University)

**TS09W\_BP\_18**

**Development of pH-Responsive Drug Releasing System for Enhanced Ferroptosis-Based Anticancer Therapy**

Seohee Lee, Junha Lim, and Wonjong Kim

(POSTECH)

**TS09W\_BP\_19**

**Enhancing Cancer Therapy with CXCR4-targeted Biomimetic Hybrid Nanovesicles for Dual Delivery of Manganese and Doxorubicin**

Yeonwoo Jang<sup>1</sup>, Young Seok Cho<sup>2</sup>, James J. Moon<sup>2</sup>, and Hansoo Park<sup>1</sup>

(<sup>1</sup>Chung-Ang University, <sup>2</sup>University of Michigan)

**TS09W\_BP\_20**

**Harnessing Dual Responsive DNA-Functionalized Gold Nanoparticles for Enhanced Photothermal Anti-tumor Therapy**

Yunyoung Nah<sup>1</sup>, Jinseong Kim<sup>1</sup>, and Won Jong Kim<sup>1,2</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)

**TS09W\_BP\_21**

**Nanostructured Casein-Tannic Acid Film for Environmentally Friendly Hair Protection**

Sujin Kyung, Yeon Tae Kang, and Hyun Jong Lee

(Gachon University)

TS09W\_BP\_23

**Iodine and Manganese Doped Carbon Dots as Novel Radiocontrast Agents**

Zarina Baranchiyeva<sup>1</sup>, Bakyt Duisenbayeva<sup>2</sup>, Dong-Wook Han<sup>3</sup>, and Timur Sh. Atabaev<sup>1</sup>

(<sup>1</sup>Nazarbayev University, <sup>2</sup>Republican Diagnostic Center, <sup>3</sup>Pusan National University)

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## [TS09] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS09T\_BP\_1

#### Radiation-Induced Drug Release via Hyaluronic Acid Based Double Drug Loaded Nanoparticles for Cancer Treatment

Woo Hyun Kwon<sup>1,2</sup>, GeumByeol Park<sup>1</sup>, Sang Jun Park<sup>1</sup>, Chun-Ho Kim<sup>1</sup>, and Jun Shik Choi<sup>1</sup>

(<sup>1</sup>KIRAMS, <sup>2</sup>Yonsei University)

### TS09T\_BP\_3

#### Ginseng-Derived Nanovesicles Promote Osteoblast Differentiation and Mineralization

Sang-Hoon Lee, Hyun-Ju Seo, and Young-Eun Cho

(Andong National University)

### TS09T\_BP\_5

#### Utility of Edible Plant-Derived Exosome-Like Nanovesicles as a Novel Delivery Platform for the Vaccine Development

Yu-Seong Park, Sang-Hoon Lee, and Young-Eun Cho

(Andong National University)

### TS09T\_BP\_6

#### Development of SPION and Dox-Loaded Nanoparticles for Targeted Cancer Treatment under PEMF Activation

Jaehoon Ko, Yoonho Hwang, Hyeyoun Cho, Seonmin Choi, and Jaehong Key

(Yonsei University)

### TS09T\_BP\_7

#### Advanced PLGA-Based Discoidal Polymeric Particles for Enhanced Nintedanib Delivery in Idiopathic Pulmonary Fibrosis Therapy

Hyeyoun Cho, Seonmin Choi, Yoonho Hwang, Jaehoon Ko, Sanghyo Park, and Jaehong Key

(Yonsei University)

## [TS09] Poster Session 3

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

### TS09F\_P\_1

#### **Development of Long-Circulating Hemoglobin-Based Nano-Oxygen Carrier**

Hyemin Cho, Kidong Kim, Jaeun Oh, and Sejin Son

*(Inha University)*

### TS09F\_P\_2

#### **Cosmetic Transdermal Optimization: Paving the Way for Future Nanomedical Applications**

Yoonho Hwang, Jaehoon Ko, Seonmin Choi, Hyeyoun Cho, and Jaehong Key

*(Yonsei University)*

### TS09F\_P\_3

#### **Discoidal Polymeric Particles for Lung Metastasis Treatment: Enhancing the Efficacy and Minimizing the Side Effects of Doxorubicin**

Hyeyoun Cho, Yoonho Hwang, Jaehoon Ko, Seonmin Choi, Sanghyo Park, and Jaehong Key

*(Yonsei University)*

### TS09F\_P\_4

#### **Preparation of Uniform Silica Coated Iron Oxide Nanoparticles for Magnetic Hyperthermia Applications**

Tianyu Chen and Yuanzhe Piao

*(Seoul National University)*

### TS09F\_P\_5

#### **Barley $\beta$ -glucan/CpG/Ag Nanocomplexes for Macrophage Targeting and M1 Polarization**

Seoyeon Park, Migyeom Lee, Seoyoung Kim, and Tae-il Kim

*(Seoul National University)*

### TS09F\_P\_6

#### **Proteomic Analysis of Cellular Responses in A549 Cells Treated with Bovine Serum Albumin Coated Multi-Walled Carbon Nanotubes**

Sun Young Lee, Jae-Won Choi, Min Beom Heo, Tae Geol Lee, and Jin Gyeong Son

*(KRISS)*

**TS09F\_P\_7**

**Size Controllable Bioimaging Agent for Lymph Node Detect**

Jaeseong Lee, Hyeseon Park, and Gayong Shim

*(Soongsil University)*

**TS09F\_P\_8**

**Development of Salivary Gland Disease Treatment using Functional Exosomes from Stem Cells for Ductal Delivery**

Eun ji Yeom and Won-Gun Koh

*(Yonsei University)*

**TS09F\_P\_9**

**Hypoxia-Responsive Nanoparticle for Targeting Tumor-Associated Macrophage in Tumor Microenvironment for Advanced Immunotherapy**

Mihyeon Park<sup>1</sup>, Yeoul Kang<sup>1</sup>, and Won Jong Kim<sup>1,2</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)*

**TS09F\_P\_10**

**Preparation of Antioxidant Drug Coating on Biodegradable Vascular Scaffolds via Electrospinning**

Byeongseok Ryu, Yu Jin Chi, and Won-Gun Koh

*(Yonsei University)*

**TS09F\_P\_11**

**Targeted Self-Immolative Nitric Oxide Prodrug for Lymph-Directed Inhibition of Intractable Metastatic Cancer**

Hong Lyun Kim<sup>1</sup> and Won Jong Kim<sup>1,2</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)*

**TS09F\_P\_12**

**Polymerized Phenylboronic Acid and Mannan-Based Injectable Gel for Enhancing Cancer Immunotherapy**

Hong Lyun Kim<sup>1</sup> and Won Jong Kim<sup>1,2</sup>

*(<sup>1</sup>POSTECH, <sup>2</sup>OmniaMed Co., Ltd.)*

**TS09F\_P\_13**

**Development of Polyaniline-Gold Hybrid Nanostructures for NIR II Window Photoacoustic Imaging and Photothermal Therapy**

Eun Sook Lee<sup>1</sup>, Jinhyung Lee<sup>1</sup>, Jung-Sub Wi<sup>2</sup>, and Hee-Kyung Na<sup>1</sup>

*(<sup>1</sup>KRISS, <sup>2</sup>Hanbat National University)*

**TS09F\_P\_14**

**Preparation and Analysis of Cerium Oxide Nano Composite Containing GelMA Hydrogel Ophthalmic Material**

Chae Young Kim and A-Young Sung  
(*Daegu Catholic University*)

**TS09F\_P\_15**

**Manufacturing of Lipid Nanoparticles for Microfluidic-Based Nucleic Acid Therapy**

Hyeseon Park, Jaeseong Lee, and Gayong Shim  
(*Soongsil University*)

**TS09F\_P\_16**

**Biomimetic Scaffold for Dual-Drug Releasing Systems to Promote Angiogenesis-Coupled Osteogenesis via Hydrogel-Entrapped Nanofibers**

YoungBin Kim and Won-Gun Koh  
(*Yonsei University*)

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# Technical Sessions

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## **[TS10] Nanoelectronic and Quantum Devices**

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### **Theme: From Nanoelectronics to Quantum Technology**

To adapt to the new world of virtual reality, metaverse, big data, and beyond, there is an absolute need for the next generation technology than can overcome the present technological limits and develop new types of electronic devices. Nanotechnologies have contributed to both further scale down of the conventional silicon devices and emergence of the unprecedented novel devices, such as quantum devices. In the session, various advances in nano materials, structures, and devices for electronic applications will be discussed with a focus on their intrinsic properties, operating principles, and implications to advanced silicon technologies and emerging devices. The presentation of these cutting-edge research findings will provide an opportunity to illuminate the role of nanoelectronic engineering in ushering in the quantum era and presenting its vision.

[TS10W1]

Nanoelectronic and Quantum Devices 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:15
Place	Room 206A
Session Chair(s)	Hyo Won Kim (SAIT)

TS10W1\_I\_1    \*Invited    09:00–09:30

Semiconductor Technology for Quantum Computing  
Silvano De Franceschi  
(Grenoble Alpes University)

TS10W1\_O\_2    09:30–09:45

Link between T-Linear Resistivity and Quantum Criticality in Ambipolar Black Phosphorus  
Nasir Ali<sup>1</sup>, Fida Ali<sup>2</sup>, Hyokwang Park<sup>1</sup>, and Won Jong Yoo<sup>1</sup>  
(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Aalto University)

TS10W1\_O\_3    09:45–10:00

Mitigating Pass Gate Effect in Buried Channel Array Transistors through Buried Oxide Integration:  
Addressing Interference Phenomenon between Word Lines  
Young Myeong Cho, Yeon Seok Kim, and Min-Woo Kwon  
(Gangneung-Wonju National University)

TS10W1\_O\_4    10:00–10:15

Downscaling Effects on Resistivity of Topological Metal Nanowire for Energy-Efficient Interconnects  
Hyeuk Jin Han  
(Sungshin Women's University)

## [TS10W2]

### Nanoelectronic and Quantum Devices 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:55
Place	Room 206A
Session Chair(s)	Jun Woo Choi (KIST)

<b>TS10W2_I_1</b>	<b>*Invited</b>	<b>15:40–16:10</b>
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**Hole-Based Spin Qubits in Semiconductor Quantum Dot Systems**

Yun-Pil Shim

*(The University of Texas at El Paso)*

<b>TS10W2_I_2</b>	<b>*Invited</b>	<b>16:10–16:40</b>
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**Superconducting Cavity Electromechanics for Quantum Sensing**

Junho Suh

*(POSTECH)*

<b>TS10W2_I_3</b>	<b>*Invited</b>	<b>16:40–17:10</b>
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**Hamiltonian Engineering for Fixed-Frequency Superconducting Qubits**

Yosep Kim

*(Korea University)*

<b>TS10W2_O_4</b>		<b>17:10–17:25</b>
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**Optimization of Multilayer TiO<sub>2</sub>/HfO<sub>2</sub> RRAM Structure with Self-Rectifying Characteristics**

Chan-Hyeok Nam, Da Gyo Yoo, Gyu Beom Kim, and Myung-Hyun Baek

*(Gangneung-Wonju National University)*

<b>TS10W2_O_5</b>		<b>17:25–17:40</b>
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**Tilt-Engineered Molecular-Scale Selector Capable of Enhancing Pattern Recognition Accuracy**Jung Sun Eo<sup>1</sup>, Jaeho Shin<sup>2</sup>, Takkyeong Jeon<sup>1</sup>, Jingon Jang<sup>1</sup>, and Gunuk Wang<sup>1</sup>*(<sup>1</sup>Korea University, <sup>2</sup>Rice University)*

<b>TS10W2_O_6</b>		<b>17:40–17:55</b>
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**Investigation of the Effects of External Temperature Variations on Feedback Field Effect Transistor and Sensitivity Analysis of the Device**

Hangwook Jeong, Minseon Park, and Min-Woo Kwon

*(Gangneung-Wonju National University)*

[TS10T3]

Nanoelectronic and Quantum Devices 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 206A
Session Chair(s)	Hongseok Oh (Soongsil Univ.)

TS10T3\_I\_1    **\*Invited**    09:00–09:30

Quantum Computing as a Tool for Scientific Research: Era of Quantum Utility  
Hanhee Paik  
(*IBM Quantum*)

TS10T3\_I\_2    **\*Invited**    09:30–10:00

Scaling of Operating Voltage of HZO Ferroelectric Capacitors for Low Power Nonvolatile Memory Applications  
Jiyoung Kim<sup>1</sup>, MinJong Lee<sup>1</sup>, JinHyun Kim<sup>1</sup>, SoonMyung Kwon<sup>1</sup>, Soham Shirodkar<sup>1</sup>, Seongbin Park<sup>2</sup>, Jongmug Kang<sup>2</sup>, and Si Joon Kim<sup>2</sup>  
(<sup>1</sup>*University of Texas at Dallas*, <sup>2</sup>*Kangwon National University*)

TS10T3\_O\_3    10:00–10:15

Investigating Magnetic Multi-Walled Carbon Nanotubes Irradiated by Swift Heavy Ion Irradiations for Quantum Device Applications: A XAS and XMCD Study  
Sanjeev Gautam<sup>1</sup>, P. Thakur<sup>2</sup>, Saji Augustine<sup>3</sup>, Han-Koo Lee<sup>4</sup>, K. Asokan<sup>5</sup>, and Keun Hwa Chae<sup>6</sup>  
(<sup>1</sup>*Panjab University*, <sup>2</sup>*Diamond Light Source Ltd.*, <sup>3</sup>*Deva Matha College Kuravilangad*, <sup>4</sup>*Pohang Accelerator Laboratory*, <sup>5</sup>*Inter-University Accelerator Center*, <sup>6</sup>*KIST*)

TS10T3\_O\_4    10:15–10:30

Demonstration of Synaptic Behavior under Identical Pulses in Selector-Less HfO<sub>x</sub>-Based RRAM for Neuromorphic Computing Systems  
Yunsur Kim and Jiyong Woo  
(*Kyungpook National University*)

# [TS10T4]

## Nanoelectronic and Quantum Devices 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 206A
Session Chair(s)	Kyungmee Song (SAIT)

TS10T4_I_1	<b>*Invited</b>	14:00–14:30
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**Large Area Electronics based on 2D materials**

Jong-Hyun Ahn

*(Yonsei University)*

TS10T4_O_2	14:30–14:45
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**Process Control of Novel Molybdenum Nitride Electrode for Enhanced Reliability of (Hf,Zr)O<sub>2</sub> Ferroelectric Thin Film**

Hyojun Choi, Kun Yang, Ju Yong Park, Sun Young Lee, Jaewook Lee, Dong In Han, and Min Hyuk Park

*(Seoul National University)*

TS10T4_O_3	14:45–15:00
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**The Impact of Tin Doping on the Physical Characteristics of CdO Nanostructured Films**

Hassan Haruna, Abdurrahman Isa Hamza, and Murtala Ibrah

*(Kano State Polytechnic)*

TS10T4_O_4	15:00–15:15
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**Bidirectional GeS-Based Threshold Switching Selector Device with High Uniformity for Integration in ReRAM Cross-Point Arrays**

Asif Ali, Haider Abbas, Li Jiayi, and Diing Shenp Ang

*(Nanyang Technological University)*

TS10T4_O_5	15:15–15:30
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**Role of Oxide Barrier in NbO<sub>x</sub> Layer with Noninert Electrodes for High-Yield Threshold Switching Characteristics**

Hyeonsik Choi and Jiyong Woo

*(Kyungpook National University)*

[TS10T5]

Nanoelectronic and Quantum Devices 5

Date & Time	July 4(Thu.), 2024 / 15:40–17:40
Place	Room 206A
Session Chair(s)	Hyeon-Jin Shin (GIST)

TS10T5_I_1	<b>*Invited</b>	15:40–16:10
Harnessing Novel Hall Effects for Spintronics		
Roland Kawakami <i>(The Ohio State University)</i>		
TS10T5_I_2	<b>*Invited</b>	16:10–16:40
Bioinspired In–Sensor Spectral Adaptation for Perceiving Spectrally Distinctive Features		
Yang Chai <i>(The Hong Kong Polytechnic University)</i>		
TS10T5_O_3		16:40–16:55
Two–Dimensional Materials–Based Transistor and Photodetector Array for High–Performance Flexible X–ray Detector		
Beom Jin Kim <sup>1</sup> , Bangjie Shao <sup>2</sup> , Chai Yang <sup>2</sup> , and Jong–Hyun Ahn <sup>1</sup> <i>(<sup>1</sup>Yonsei University, <sup>2</sup>The Hong Kong Polytechnic University)</i>		
TS10T5_O_4		16:55–17:10
Dual Ferroelectric Stack with Tunable Coercive Voltage for High–Density 3D Memory Applications		
Jiae Jeong and Jiyong Woo <i>(Kyungpook National University)</i>		
TS10T5_O_5		17:10–17:25
Effect of Al Dopant Distribution in HfO <sub>2</sub> Layer on Ferroelectric Switching Characteristics		
Hyoungjin Park and Jiyong Woo <i>(Kyungpook National University)</i>		
TS10T5_O_6		17:25–17:40
Improvement of Synaptic Properties in Copper Ion–Based Synaptic Transistor for Neuromorphic Computing Systems		
Seonuk Jeon and Jiyong Woo <i>(Kyungpook National University)</i>		

## [TS10F6]

### Nanoelectronic and Quantum Devices 6

Date & Time	July 5(Fri.), 2024 / 09:00–10:15
Place	Room 206A
Session Chair(s)	Yonghun Kim (KIMS)

TS10F6_I_1	<b>*Invited</b>	09:00–09:30
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**Uniform TMDC Film Deposited by PVD Method**

Hitoshi Wakabayashi

*(Tokyo Institute of Technology)*

TS10F6_O_2	09:30–09:45
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**MoS<sub>2</sub> Active Array for the High-Resolution Monitoring of Cortical Neuron Activity**

Duo Xu, Juyeong Hong, and Jong-Hyun Ahn

*(Yonsei University)*

TS10F6_O_3	09:45–10:00
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**Electrical Characterization of Flash Memory-Based Synaptic using Liganded CdSe Quantum Dots**

Jae Min Kim, Tae Hwan Koo, So Yeon Jung, Hyeong Jin Chae, Ju Yeong Chae, and Moon Gyu Jang

*(Hallym University)*

TS10F6_O_4	10:00–10:15
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**Fabrication of Thin SOI-Based Neuromorphic Transistors with Mesh-Type Floating Gate**

Soyeon Jung, Hyeongjin Chae, Jaemin Kim, Taehwan Koo, Juyeong Chae, and Moongyu Jang

*(Hallym University)*

## [TS10] Poster Session 1      Best Poster Awards Candidates

<b>Date &amp; Time</b>	July 3(Wed.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

### TS10W\_BP\_1

#### Investigation of Electrical Properties in ReRAM Devices Utilizing IGZO with Varied Electrode Configurations

Jaewook Park, Jaegoo Lee, and Hongseok Oh  
(*Soongsil University*)

### TS10W\_BP\_2

#### Generation of Indistinguishable and Efficient Single Photons from Quantum Dots

Dong Hyun Park, Kyu Young Kim, and Je Hyung Kim  
(*UNIST*)

### TS10W\_BP\_3

#### Enhancement of the Mobility in Rare Metal-Free Oxide Semiconductors through Metal Induced Crystallization

Kyusun Han, Jiyong Kim, Jaegoo Lee, and Hongseok Oh  
(*Soongsil University*)

### TS10W\_BP\_4

#### Reversible Oxidative p-doping in Two-Dimensional Tin Halide Perovskite Transistors

Jaeyong Woo<sup>1</sup>, Yeeun Kim<sup>1</sup>, Young-Kwang Jung<sup>2</sup>, Heebeom Ahn<sup>1</sup>, Inha Kim<sup>1</sup>, Youjin Reo<sup>3</sup>, Hyungbin Lim<sup>1</sup>, Changjun Lee<sup>1</sup>, Jonghoon Lee<sup>1</sup>, Yongjin Kim<sup>1</sup>, Hyeonmin Choi<sup>1</sup>, Min-Hyun Lee<sup>4</sup>, Jeongjae Lee<sup>6</sup>, Samuel D. Stranks<sup>2</sup>, Henning Sirringhaus<sup>2</sup>, Yong-Young Noh<sup>3</sup>, Keehoon Kang<sup>1</sup>, and Takhee Lee<sup>1</sup>  
(<sup>1</sup>*Seoul National University*, <sup>2</sup>*University of Cambridge*, <sup>3</sup>*POSTECH*, <sup>4</sup>*Samsung Electronics Co., Ltd.*)

### TS10W\_BP\_5

#### Large HOMO–LUMO Gap Molecular Transistors Enabled by Mixed SAM Configurations

Donguk Kim, Hyemin Lee, Minwoo Song, Jongwoo Nam, and Takhee Le  
(*Seoul National University*)

### TS10W\_BP\_6

#### Highly Sensitive and Fast Responding Flexible Force Sensors using ZnO/ZnMgO Coaxial Nanotubes on Graphene Layers for Breath Sensing

Asad Ali<sup>1</sup>, Jamin Lee<sup>1</sup>, Kyoungho Kim<sup>1</sup>, Hongseok Oh<sup>2</sup>, and Gyu-Chul Yi<sup>1</sup>  
(<sup>1</sup>*Seoul National University*, <sup>2</sup>*Soongsil University*)



**TS10W\_BP\_7**

**Spectral Tunability and Performance Enhancement in Hybrid Graphene-Based Photodetectors via Interfacial Photogating Effect**

Hai Phuong Duong and Ki Kang Kim

*(Sungkyunkwan University)*

**TS10W\_BP\_8**

**Photo-Oxidative Crack Propagation in Transition Metal Dichalcogenides**

Andrew Ben-Smith<sup>1</sup>, Soo Ho Choi<sup>1</sup>, Stephen Boandoh<sup>1</sup>, Byung Hoon Lee<sup>1</sup>, Duc Anh Vu<sup>1</sup>, Huong Thi Thanh Nguyen<sup>1</sup>, Laud Anim Adofo<sup>1</sup>, Jeong Won Jin<sup>1</sup>, Soo Min Kim<sup>2</sup>, Young Hee Lee<sup>1</sup>, and Ki Kang Kim<sup>1</sup>

*(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Sookmyung Women's University)*

**TS10W\_BP\_9**

**High-Luminance Deep-Blue Light Emitting Diode Fabricated from Defect-Controlled Graphene Quantum Dots**

Sukki Lee<sup>1</sup>, Jinu Park<sup>1</sup>, Byungha Shin<sup>1</sup>, and Seokwoo Jeon<sup>2</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>Korea University)*

**TS10W\_BP\_10**

**Reconfigurable VO<sub>2</sub> Mott Memristor for Neuromorphic Electronics**

Gwanyong Park, Sanghyeon Choi, and Gunuk Wang

*(Korea University)*

**TS10W\_BP\_11**

**Evaluation of Electrical Properties of Pt/Cr/HfO<sub>2</sub>/Pt/Cr/HfO<sub>2</sub>/SiO<sub>2</sub>/Si Flash-Type Gate Stack Capacitors as a Function of SiO<sub>2</sub> Oxide Film Thickness**

TaeHwan Koo, HyeongJin Chae, SoYeon Jung, JaeMin Kim, JuYeong Chae, and Moongyu Jang

*(Hallym University)*

**TS10W\_BP\_12**

**In-Depth Study on Multi-Level Cell Characteristics of TaOx-Based Vertical RRAM for 3D Stackable Memory Applications**

Hojin Moon, Seonuk Jeon, Yunsur Kim, and Jiyong Woo

*(Kyungpook National University)*

**TS10W\_BP\_13**

**Probabilistic Bits with SiO<sub>x</sub>-Based Threshold Switches for Vehicle Routing Problem**

Jihyun Kim, Hyun Wook Kim, Hyeonsik Choi, and Jiyong Woo

*(Kyungpook National University)*

### TS10W\_BP\_14

#### **Effect of Post-Annealing in Back-End-Of-Line Compatible Transistors with Oxide Channel/High-k Dielectric Stacks for 3D Stackable Memory Applications.**

Nayeon Kim, Hyoungjin Park, Jiae Jeong, and Jiyong Woo

*(Kyungpook National University)*

### TS10W\_BP\_15

#### **UV Response of IGZO Tunnel-Contact SGTs for Low-Power and High-Sensitivity UV Sensor Applications**

Junhyun Kim and Hongseok Oh

*(Soongsil University)*

### TS10W\_BP\_16

#### **Memristive Switching Mechanism of $\text{TiO}_2/\text{Al}_2\text{O}_3$ Crossbar Array Deposited by Atomic Layer Deposition Method and its Logic Gate Application**

Woohyeon Ryu, Chansoo Yoon, Sohwi Kim, and Bae Ho Park

*(Konkuk University)*

### TS10W\_BP\_17

#### **Spin-On Dopant Process as an Alternative Method for the Formation of Source/Drain of the Silicon MOSFET**

Byeong Seon Kim, YunJu Oh, Seok Ki Lee, E Kyoung Kim, Areum Han, and Moon Hee Kang

*(Chungbuk National University)*

### TS10W\_BP\_18

#### **Enhancing Performance of Homojunction a-InGaZnO Thin Film Transistors through Oxygen Vacancy Concentration Differences**

Yerim Lee, Junbeom Lee, Suhwon Choi, Yeoeun Yun, Jiyoung Bang, Hyeonjeong Sun, Seungmin Choi, Youngsoo Noh, Hyowon Kim, Seungjae Lee, Kyubin Hwang, and Seung-Beck Lee

*(Hanyang University)*

### TS10W\_BP\_19

#### **Improving Performance of Oxide Thin Film Transistors using Sputtering of Multi-Stack Oxide Heterostructure Layer**

Geonwoo Kim, Seungha Lee, Sehee Gu, Seungjae Lee, Hyowon Kim, Jiyoung Bang, Hyeonjeong Sun, Youngsoo Noh, Seungmin Choi, Yeoeun Yun, Kyubin Hwang, Eunsuk Choi, and Seung-Beck Lee

*(Hanyang University)*

### TS10W\_BP\_20

#### **Achieving High Field-Effect Mobility of Top Gate a-IGZO TFTs with High-k Gate Insulator through Capping Layer Oxidation**

Jinwook Do, Taeyang Kim, Jeongeun Kim, Jeemin Kang, Kyubin Hwang, Jiyoung Bang, Hyeonjeong Sun, Seungmin Choi, Yeongsoo Noh, Hyowon Kim, Seungjae Lee, Yeoeun Yun, and Seung-Beck Lee

## [TS10] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS10T\_BP\_1

#### Enhanced Memory Window in MIFIS-FeFET using Si<sub>3</sub>N<sub>4</sub> Charge Injection Layer

Hyo Jin Ahn, Hyun Jin Lim, Sang Kuk Han, Hyeong Jun Kim, Jihyeon Sim, Kisub Kim, Yoon Ji Kim, and Changhwan Choi

(Hanyang University)

### TS10T\_BP\_2

#### Nonreciprocal Multimode Phonon Transfer in Microwave Optomechanical System at Room Temperature

Mungyeong Jeong and Junho Suh

(POSTECH)

### TS10T\_BP\_3

#### One-Dimensional WO<sub>x</sub>-Based Physical Reservoir Computing for Wearable Neuromorphic Applications

H. Shin<sup>1</sup>, H. Cho<sup>1</sup>, D. H. Kim<sup>2</sup>, T. W. Kim<sup>2</sup>, and G. Wang<sup>1</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Jeonbuk National University)

### TS10T\_BP\_4

#### Reliable, Secure, and Energy-Efficient Physical Unclonable Functions via Dynamic Dewetting Process

Gwangsik Mun, Yeongin Cho, Hanhwi Jang, Jeongsu Pyeon, Hyoungsoo Kim, and Yeon Sik Jung

(KAIST)

### TS10T\_BP\_5

#### Boron-Doped Carbon Nanotubes: Field Emission Applications Explored through Density Functional Theory and Experimental Analysis

Syed Muhammad Zain Mehdi, Jeung Choon Goak, and Naesung Lee

(Sejong University)

### TS10T\_BP\_6

#### 16x16 Active-Matrix Thermal Sensor Array using IGZO Thin-Film Transistor

Hyunsoo Kim, Hyerin Jo, and Hongseok Oh

(Soongsil University)

**TS10T\_BP\_7**

**FN Tunneling Properties of A-BN and its Application to Synaptic Transistors**

Won Suk Oh, Hwaseon Jo, Jaegoo Lee, and Hongseok Oh

*(Soongsil University)*

**TS10T\_BP\_8**

**Exploring the Effect of Metal Silicides on Adhesion Strength and Field Emission Performance of CNT Field Emitters: A Study on  $\text{Ni}_2\text{Si}$  and  $\text{Fe}_2\text{NiSi}$**

Sayed Zafar Abbas and Naesung Lee

*(Sejong University)*

**TS10T\_BP\_9**

**Investigation of Channel Thickness and Low-Frequency Noise Modulation via Substrate-Biasing of Double-Gated Multilayer  $\text{MoS}_2$  Field-Effect Transistors with h-BN Dielectrics**

Jimin Park<sup>1,2</sup>, Junho Nam<sup>1</sup>, Jangyup Son<sup>1</sup>, Dae-Young Jeon<sup>3</sup>, Seong Heon Kim<sup>2</sup>, and Dong Su Lee<sup>1</sup>

*(<sup>1</sup>KIST, <sup>2</sup>Jeonbuk National University, <sup>3</sup>Gyeongsang National University)*

**TS10T\_BP\_10**

**CNTs Field Emitter with Exceptionally Stable Field Emission Performance by Improving Cohesion and Adhesion Strength through Metal Phosphide Formation**

Jaewon Cho and Naesung Lee

*(Sejong University)*

NANO  
KOREA  
2024  
Symposium

## [TS10] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS10T\_P\_1

#### Ultrahigh-Photocurrent Gain Photodetector based on 2D Materials/High Density Nanodot Array Hybrid Structure

Jiyeong Kim, Gwangtaek Oh, Jihoon Jeon, Sohwi Kim, and Bae Ho Park  
(Konkuk University)

### TS10T\_P\_2

#### Synaptic MoS<sub>2</sub> Transistors based on Charge Trapping Two-Dimensionally Confined in Sr<sub>2-x</sub>CoxNb<sub>3</sub>O<sub>10</sub> Nanosheets

DaYea Oh, Haena Yim, So Yeon Yoo, Gwangtaek Oh, Chansoo Yoon, Ji-Won Choi, and Bae Ho Park  
(Konkuk University)

### TS10T\_P\_3

#### Implementation of Threshold- and Memory-Switching Memristors based on Electrochemical Metallization in an Identical Ferroelectric Electrolyte

Chansoo Yoon and Bae Ho Park  
(Konkuk University)

### TS10T\_P\_4

#### Vertical Floating Gate Memristor Array with Diode Characteristics for Neuromorphic System Development

Sohyeon Park and Woojong Yu  
(Sungkyunkwan University)

### TS10T\_P\_5

#### Fabrication and Investigation of Graphene-Based Heterojunction Structures with Ferroelectric Materials for Enhanced Semiconductor Devices

Duk Hyun Lee, Jihoon Jeon, Dayea Oh, Woohyeon Ryu, and Bae Ho Park  
(Konkuk University)

**TS10T\_P\_6**

**Mixed-Dimensional Halide Perovskite QDs Synapses for Self-Rectifying and Luminous Artificial Neural Networks**

Young Ran Park and Gunuk Wang

*(Korea University)*

**TS10T\_P\_8**

**IGZO as a Resistive Switching Layer and its Non-Volatile Property**

Hyongsuk Choo and Jin-Hong Park

*(Sungkyunkwan University)*

NANO  
KOREA  
2024  
Symposium

## [TS10] Poster Session 3

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 10:30-12:00
<b>Place</b>	Exhibition Hall 4,5

### TS10F\_P\_1

#### Enhancing MoS<sub>2</sub> Field-Effect Transistors Performance via Mild Plasma Treatment

Seojoo Lee and Jin-Hong Park

*(Sungkyunkwan University)*

### TS10F\_P\_2

#### Photoinduced Doping Effect and its Application to the Logic Device

Hojin Choi and Jin-Hong Park

*(Sungkyunkwan University)*

### TS10F\_P\_3

#### Analyzing Electrical Behavior in Field-Effect Transistors (FETs) Utilizing 2D Transition Metal Dichalcogenides (TMDs) Channels with NbSe<sub>2</sub> Contacts

Yena Kim and Jinhong Park

*(Sungkyunkwan University)*

### TS10F\_P\_4

#### Vertical Synapse based on Van der Waals(VdW) Heterostructures

Jiwon Moon<sup>1</sup> and Jin-Hong Park

*(Sungkyunkwan University)*

### TS10F\_P\_5

#### Effect of MoS<sub>2</sub> Switching Layer Properties on Synaptic Device Performance

Hee Yoon Jang, Do Young Kim, Seo Hyeon Moon, and Seoung-Ki Lee

*(Pusan National University)*

### TS10F\_P\_6

#### Twist Angle-Dependent Transport Properties of Twisted Bilayer Graphene

Jin Hong Kim, Jin Sik Choi, and Bae Ho Park

*(Konkuk University)*

### TS10F\_P\_7

#### Effect of Semiconductor Composition on Channel Shortening in Oxide Thin-Film Transistor

Jong Beom Ko<sup>1</sup>, Seong-Jae Kim<sup>2</sup>, and Sang Hee Park<sup>2</sup>

(<sup>1</sup>Hanbat National University, <sup>2</sup>KAIST)

### TS10F\_P\_8

#### Nonlinear Electrostrictive Surface Acoustic Wave in SrTiO<sub>3</sub>

Kiryang Park and Junho Suh

(POSTECH)

### TS10F\_P\_9

#### Work Function Modulation in MoS<sub>2</sub>-Based Transistor with Graphene Source/Drain Contact

Se Hee Lee and Jin-Hong Park

(Sungkyunkwan University)

### TS10F\_P\_10

#### Fabrication and Optimization of Memristor with Interfacial Oxidation for Suitable and Improved Performance

Seongwoo Jung and Byoungdeog Choi

(Sungkyunkwan University)

### TS10F\_P\_11

#### Modulation Oxygen Vacancies in Bilayer-Structured Amorphous InGaSnO/TiO<sub>2</sub> Thin Film Transistors via TiO<sub>2</sub> Oxygen-Capturing layer and UV/Ozone Treatment

Hwan-gyu Lee and Byoung-Deog Choi

(Sungkyunkwan University)

### TS10F\_P\_12

#### Self-Limiting Oxidation by UV-O<sub>3</sub> Treatment and WSe<sub>2</sub> p-Doping

Taehyuk Jang and Jin-Hong Park

(Sungkyunkwan University)

### TS10F\_P\_13

#### Investigating Rare-Metal-Free Oxide Semiconductor for Enhanced Electrical and Thermal Performance

Jiyong Kim, Kyusun Han, Jaegoo Lee, and Hongseok Oh

(Soongsil University)



**TS10F\_P\_14**

**Threshold Voltage Modulation in 2D MoS<sub>2</sub> Semiconductors**

Hyeong Seok Lee and Jin-Hong Park

*(Sungkyunkwan University)*

**TS10F\_P\_15**

**Negative Differential Resistance Device with Partial Potential Modulation**

Junseo Lee and Jin-Hong Park

*(Sungkyunkwan University)*

**TS10F\_P\_16**

**Field-Effect Transistor Memory Employing a Halide Perovskite and its Switching Mechanism**

Donghyeok Kim, Chanhyeok Kim, Hanul Min, and Gunuk Wang

*(Korea University)*

**TS10F\_P\_17**

**Radiation Hardness of High-Performance Te PFET via Al<sub>2</sub>O<sub>3</sub> Passivation**

Minjae Kim, Kyuheon Kim, Hae-Won Lee, Jae Hyeon Jun, Chan Bin Lee, and Byoung Hun Lee

*(POSTECH)*

**TS10F\_P\_18**

**Thermal-Dependent Chromatic Modulative Luminescence in Sm<sup>3+</sup>/Er<sup>3+</sup>-Doped Calcium Gallo-Germanate Crystals**

Sangwon Wi, Yunho Jin, and Yunsang Lee

*(Soongsil University)*

**TS10F\_P\_19**

**Infrared (IR) Regulation Properties of a CVD-grown VO<sub>2</sub> Thin Film for Dynamic Radiative Cooling (DRC)**

Nayoung Wi<sup>1,2</sup>, Hyojin Bang<sup>1,2</sup>, Hongseung Kim<sup>2</sup>, Yonghun Kim<sup>1</sup>, and Jongwon Yoon<sup>1</sup>

*(<sup>1</sup>KISM, <sup>2</sup>National Korea Maritime and Ocean University)*

**TS10F\_P\_20**

**High-Accuracy Analog Neuromorphic Computing by a Solid Electrolyte-Gated 2D-MoS<sub>2</sub> Synaptic Transistor with Lithium Silicate (LiSiO<sub>x</sub>)**

Byeongjin Park<sup>1,2</sup>, Soon-Yong Kwon<sup>2</sup>, and Yonghun Kim<sup>1</sup>

*(<sup>1</sup>KISM, <sup>2</sup>UNIST)*

### TS10F\_P\_21

#### Hydrophilic $\text{Si}_3\text{N}_4$ Substrate-Assisted Wet-Transfer Method for Facile Wrinkle Control in 2D- $\text{MoS}_2$ Thin Films for Enhancing FET Device Performance

Seungkwon Hwang<sup>1,2</sup> and Yonghun Kim<sup>1</sup>

(<sup>1</sup>KIMS, <sup>2</sup>POSTECH)

### TS10F\_P\_22

#### Multiferroic effect in HZO/ $\text{Fe}_3\text{GeTe}_2$ Heterostructures

Yong Ha Shin and Woo Jong Yu

(Sungkyunkwan University)

### TS10F\_P\_23

#### Effective Hydrogen Sulfide Gas Detection Utilizing Functionalized Carbon Nanotubes

RyangHa Kim, KyungEun Kim, and YoungLae Kim

(Gangneung-Wonju National University)

### TS10F\_P\_24

#### Exploring Quantum Bulk Acoustic Wave Resonator with Millimeter Waves

Changjoo Lee and Junho Suh

(POSTECH)

# Technical Sessions

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## **[TS11] Nanophotonics and its Applications**

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### **Theme: Interactions of Photons with Nano-Structures and their Applications**

The interaction of light with nanoscale materials and structures presents new possibilities in the generation of light, control of light, and measurement of light due to its unique and diverse properties. These new nanophotonics technologies can be actively used in bio, medicine, displays, communications, and quantum information. In this session, it is discussed how we can overcome existing technological limitations and create new applications by exchanging the latest research results and ideas in the fields of nanophotonic technologies such as metamaterials, near-field optics, photonic crystals, and plasmonics, quantum information processing as well as nanostructure fabrication and manufacturing.

[TS11W1]

Nanophotonics and its Applications 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:15
Place	Room 303
Session Chair(s)	Yunwoo Lee (KIMM)

TS11W1_I_1	*Invited	09:00–09:30
Sustainable and Scalable Additive Manufacturing of Nano Plasmonic Platform for Spectroscopy, Sensing and Thermal Management		
Ahmed A. Busnaina (Northeastern University)		
TS11W1_O_2		09:30–09:45
All-Inorganic Perovskite Cs <sub>3</sub> Cu <sub>2</sub> I <sub>5</sub> Films via CVD for High-Performance Ultraviolet Self-Powered Photodetectors		
Van-Hoang Vuong and Soon-Gil Yoon (Chungnam National University)		
TS11W1_O_3		09:45–10:00
Analytic Overlap Integral Computation for Enhanced Multi-Waveguide Fourier Coupled-Mode Theory		
Sehyeon Jeong, JongHyun Lee, Myeonggyu Choi, and Hwi kim (Korea University)		
TS11W1_O_4		10:00–10:15
Biomolecule Detection based on Infrared Metamaterial Absorber with Vertical Nanogap		
Dohyun Kang <sup>1</sup> , Mingyun Kim <sup>2</sup> , Jongwon Lee <sup>2</sup> , and Joo-Yun Jung <sup>1</sup> ( <sup>1</sup> KIMM, <sup>2</sup> UNIST)		

## [TS11W2]

### Nanophotonics and its Applications 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:25
Place	Room 303
Session Chair(s)	Jihye Lee (KIMM)

<b>TS11W2_I_1</b>	<b>*Invited</b>	<b>15:40–16:10</b>
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**Nanopot Plasmonic Sensor: A Platform for Detecting a Wide Range of Viruses**

Nam-Joon Cho and Munho Kim

*(Nanyang Technological University)*

<b>TS11W2_I_2</b>	<b>*Invited</b>	<b>16:10–16:40</b>
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**Intersubband Polaritonic Metasurfaces**

Jongwon Lee

*(UNIST)*

<b>TS11W2_O_3</b>		<b>16:40–16:55</b>
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**Metasurface In-Coupler Design for Single RGB Waveguide with Wire Grid Polarizer**

Youngjin Jeon, Sangyoon Kim, and Hwi kim

*(Korea University)*

<b>TS11W2_O_4</b>		<b>16:55–17:10</b>
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**Utilizing Machine Learning for Accurate Structural Modeling in Organic Light-Emitting Diodes within Artificial Intelligence Frameworks**

Al Amin and Jeong-Hwan Lee

*(Inha University)*

<b>TS11W2_O_5</b>		<b>17:10–17:25</b>
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**Precise Sheet Resistance Determination in Short-Channel IGZO Transistors using the Gated Van der Pauw Technique**

Woo-Seok Lee and Jeong-Hwan Lee

*(Inha University)*

### [TS11T3]

### Nanophotonics and its Applications 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 303
Session Chair(s)	Hyeonjin Eom (KITECH)

#### TS11T3\_I\_1 \*Invited 09:00–09:30

##### Design of Holographic Near Eye Display for Augmented Reality based on Hybrid Flat Optics

Hyunwoo Kim, Sungmin Cho, Dohyeon Kim, Jaisoon Kim, and Sun-Je Kim  
(Myongji University)

#### TS11T3\_O\_2 09:30–09:45

##### Flexible Dual Fabry–Perot Interferometer Films for Higher Color Purity of Displays

Keun Soo Shin and Yun Seon Do  
(Kyungpook National University)

#### TS11T3\_O\_3 09:45–10:00

##### Automotive Window Display using Anisotropic Holographic Diffuser

Junseok Yun, Woonchan Moon, Gunhee Lee, and Joonku Hahn  
(Kyungpook National University)

#### TS11T3\_O\_4 10:00–10:15

##### High-Yield Single-Photon Devices on V-Groove Fiber Array

Woong Bae Jeon<sup>1</sup>, Jong Sung Moon<sup>1</sup>, Christopher J. K. Richardson<sup>2</sup>, Edo Waks<sup>2</sup>, and Je-Hyung Kim<sup>1</sup>  
(<sup>1</sup>UNIST, <sup>2</sup>University of Maryland)

#### TS11T3\_O\_5 10:15–10:30

##### Adaptive Bottom-Up Fabrication of Metallic Nanostructures by Nanosecond Laser-Induced Surface Modification for Structural Color Printing Application

Jong-Eun Park<sup>1</sup>, Srinivasan Arthanari<sup>2</sup>, June Sik Hwang<sup>3</sup>, Hyeonjin Eom<sup>4</sup>, and Minyang Yang<sup>1,3</sup>  
(<sup>1</sup>The State University of New York, <sup>2</sup>Chungnam National University, <sup>3</sup>KAIST, <sup>4</sup>KITECH)

## [TS11T4]

## Nanophotonics and its Applications 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 303
Session Chair(s)	Inkyu Park (KAIST)

**TS11T4\_I\_1 \*Invited 14:00–14:30**
**Design of Optoelectronic Devices through Phase Change, Doping, and Multi-Dimensional Heterostructure Engineering**

Johnny C. HO

*(City University of Hong Kong)*
**TS11T4\_I\_2 \*Invited 14:30–15:00**
**Bioinspired Smart Sensors with Nanostructures**

Zhiyong Fan

*(The University of Hong Kong)*
**TS11T4\_O\_3 15:00–15:15**
**Enhanced Optical Properties of TMDs–Si Heterojunction Devices**

Beomsu Jo, Singri Ramu, Beom Joon Jung, and Young Lae Kim

*(Gangneung–Wonju National University)*
**TS11T4\_O\_4 15:15–15:30**
**Vapor Phase Detection of Explosives by Surface Enhanced Raman Scattering and by Photoluminescence Quenching Methods**
Daegwon Noh<sup>1</sup>, Samir Adhikari<sup>1,2</sup>, Minjun Kim<sup>1</sup>, Daehyun Ahn<sup>1</sup>, Yudong Jang<sup>1,2</sup>, Donghan Lee<sup>1,2</sup>, and Eunsoo Oh<sup>1</sup>*(<sup>1</sup>Chungnam National University, <sup>2</sup>Bright Quantum Incorporated)*

[TS11T5]

Nanophotonics and its Applications 5

Date & Time	July 4(Thu.), 2024 / 15:40–16:55
Place	Room 303
Session Chair(s)	Junseong Ahn (Korea Univ.)

TS11T5\_I\_1    \*Invited    15:40–16:10

Physical Unclonable Function of Surface Random Wrinkles with Anisotropic Matter  
Kitae Kim<sup>1</sup>, Youngmin Kim<sup>2</sup>, and Jun-Hee Na<sup>1</sup>  
(<sup>1</sup>Chungnam National University, <sup>2</sup>KETI)

TS11T5\_O\_2    16:10–16:25

Tunable Optical Properties via Anisotropic Gold/Iron Oxide Nanohybrids  
Hyojung Kang, Yoojung Jeon, Seonju Park, Jayoon Lee, Kyungnae Baek, Jerome K. Hyun, and So-Jung Park  
(Ewha Womans University)

TS11T5\_O\_3    16:25–16:40

Nanotransfer-on-Things: From Rigid to Stretchable Nanophotonic Devices  
Junseong Ahn<sup>1</sup>, Ji-Hwan Ha<sup>2</sup>, Inkyu Park<sup>3</sup>, and Jun-Ho Jeong<sup>2</sup>  
(<sup>1</sup>Korea University, <sup>2</sup>KIMM, <sup>3</sup>KAIST)

TS11T5\_O\_4    16:40–16:55

Volumetric Cylindrical Display on Anisotropic Reflective Screen  
Hyeonbin Im, Hosung Jeon, Minwoo Jung, and Joonku Hahn  
(Kyungpook National University)



**[TS11] Poster Session 1****Best Poster Awards Candidates**

<b>Date &amp; Time</b>	July 3(Wed.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

**TS11W\_BP\_1****Recyclable Triboelectric Nanogenerator for Ocean Monitoring Systems**Junseong Ahn<sup>1</sup>, Ji-Hwan Ha<sup>2</sup>, Soon Hyoung Hwang<sup>2</sup>, Inkyu Park<sup>3</sup>, and Jun-Ho Jeong<sup>2</sup>*(<sup>1</sup>Korea University, <sup>2</sup>KIMM, <sup>3</sup>KAIST)***TS11W\_BP\_2****Multi-Factor Physical Unclonable Functions using Micro-Wrinkles**

Kitae Kim and Jun-Hee Na

*(Chungnam National University)***TS11W\_BP\_3****Wearable Colorimetric Sweat pH Sensor-Based Smart Textile for Cystic Fibrosis Monitoring**Ji-Hwan Ha<sup>1,2</sup>, Su A Park<sup>1</sup>, Junseong Ahn<sup>3</sup>, Yongrok Jeong<sup>4</sup>, Byung-Ho Kang<sup>1,2</sup>, Byeongmin Kang<sup>1,2</sup>, Sohee Jeon<sup>1</sup>, Soonhyoung Hwang<sup>1</sup>, Jun-Ho Jeong<sup>1</sup>, and Inkyu Park<sup>2</sup>*(<sup>1</sup>KIMM, <sup>2</sup>KAIST, <sup>3</sup>Korea University, <sup>4</sup>KAERI)***TS11W\_BP\_4****A Study on High Aspect Ratio Structure Fabrication via Microlens Arrays in SPPW Process**

Myung Seo Kim, Seok Kim, and Young Tae Cho

*(Changwon National University)***TS11W\_BP\_5****Analyzing Degradation Characteristics of Blue Thermally Activated Delayed Fluorescence Organic Light-Emitting Diodes via Capacitance-Voltage Method**

Jun-Young Park, Jian Cheng Bi, Seonghyeon Park, Ji-Sung Lee, and Byeong-Kwon Ju

*(Korea University)***TS11W\_BP\_6****Modulating the Color Spectrum of Organic Light-Emitting Diodes via Reflection Phase Delay in Nanostructures with 2,000ppi Resolution**

Seonghyeon Park, Jun-Young Park, Junbeom Song, Ji-Sung Lee, Hyejung Lim, and Byeong-Kwon Ju

*(Korea University)*

### TS11W\_BP\_7

#### Controlling the Phase Distribution of Single Bromide Quasi-2-Dimensional Perovskite Crystals via Solvent Engineering for High Efficiency Pure-Blue Light-Emitting Diodes

Seoyeon Park<sup>1</sup>, Joonyun Kim<sup>2</sup>, Soohyeong Lee<sup>3</sup>, Byeong-Gwan Cho<sup>3</sup>, and Byungha Shin<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>SAIT, <sup>3</sup>KRISS)

### TS11W\_BP\_8

#### Angle-Independent Color Filtering with Metal-Insulator-Metal-Based Meta-Mirror

Yeonah Kim and Seung-Yeol Lee

(Kyungpook National University)

### TS11W\_BP\_9

#### 3D-Printed Nano-Microstructure using Two-Photon Lithography

Yunwoo Lee, Soon-Hyoung Hwang, Sohee Jeon, Junhyuk Choi, Dae-Geun Choi, Joo-Yeon Jeong, Hyun Min Cho, Jihye Lee, Won-Seok Jang, and Jun-Ho Jeong

(KIMM)

### TS11W\_BP\_10

#### Water-Floated Nanostructure as an Innovative Nano Transfer Technique to Curved Surface and its Application: Surface Enhanced Raman Scattering

Byung-Ho Kang<sup>1,2</sup>, Junseong Ahn<sup>3</sup>, Ji-Hwan Ha<sup>1,2</sup>, Byungmin Kang<sup>1,2</sup>, Sohee Jeon<sup>2</sup>, Soon Hyoung Hwang<sup>2</sup>, Inkyu Park<sup>1</sup>, and Jun-Ho Jeong<sup>2</sup>

(<sup>1</sup>KAIST, <sup>2</sup>KIMM, <sup>3</sup>Korea University)

### TS11W\_BP\_11

#### Characteristics of Carbon By-Products Generated from Methane Gas-Liquid Metal Reaction

Young In Park and Hyeonjin Eom

(KITECH)

### TS11W\_BP\_12

#### 2 $\pi$ -Phase Tuning and Amplitude Control of Second Harmonic Generation by Nonlinear Polaritonic Metasurface

Jaesung Kim<sup>1</sup>, Jaeyeon Yu<sup>1</sup>, Gerhard Boehm<sup>2</sup>, Mikhail Belkin<sup>2</sup>, and Jongwon Lee<sup>1</sup>

(<sup>1</sup>UNIST, <sup>2</sup>Technical University of Munich)

### TS11W\_BP\_13

#### Multilayered Nanoporous Gold Nanowires Forming a Profusion Nanogaps for Surface-Enhanced Raman Spectroscopy Analysis

Hyojin An<sup>1,2</sup>, Byeong-Kwon Ju<sup>2</sup>, and Joo-Yun Jung<sup>1</sup>

(<sup>1</sup>KIMM, <sup>2</sup>Korea University)

TS11W\_BP\_14

**Wireless, Battery-Free, Optoelectronic Diagnostic Sensor Integrated Colorimetric Dressing for Wound Care**

Ji-Hwan Ha<sup>1,2</sup>, Seokjoo Cho<sup>2</sup>, Jihye Lee<sup>1</sup>, Junseong Ahn<sup>3</sup>, Yongrok Jeong<sup>4</sup>, Byung-Ho Kang<sup>1,2</sup>, Byeongmin Kang<sup>1,2</sup>, Sohee Jeon<sup>1</sup>, Soonhyoung Hwang<sup>1</sup>, Inkyu Park<sup>2</sup>, and Jun-Ho Jeong<sup>1</sup>

(<sup>1</sup>KIMM, <sup>2</sup>KAIST, <sup>3</sup>Korea University, <sup>4</sup>KAERI)

TS11W\_BP\_15

**Nanotransfer Printing of Metal and Metal-Oxide Nanopatterns on Electrospun Fibers for Wearable Healthcare Applications**

Ji-Hwan Ha<sup>1,2</sup>, Junseong Ahn<sup>3</sup>, Yongrok Jeong<sup>4</sup>, Byung-Ho Kang<sup>1,2</sup>, Byeongmin Kang<sup>1,2</sup>, Sohee Jeon<sup>1</sup>, Soonhyoung Hwang<sup>1</sup>, Inkyu Park<sup>2</sup>, and Jun-Ho Jeong<sup>1</sup>

(<sup>1</sup>KIMM, <sup>2</sup>KAIST, <sup>3</sup>Korea University, <sup>4</sup>KAERI)

TS11W\_BP\_16

**Change in Contact Angle of Water-Repellent Pattern Immersed in Water for 90 days**

Seo Rim Park, Seok Kim, and Young Tae Cho

(Changwon National University)

TS11W\_BP\_17

**Fabrication of Photopolymer-Based Nanoporous 3D Structure and Use as Absorber**

Na Ye Jang, Seo Rim Park, Seok Kim, and Young Tae Cho

(Changwon National University)

## [TS11] Poster Session 2      Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS11T\_BP\_1

#### Simulating Luminal Gratings with Spatiotemporally Modulated Coupled Resonator Optical Waveguides

Minwook Kyung, Kyungmin Lee, Yung Kim, and Bumki Min

(KAIST)

### TS11T\_BP\_2

#### Ultrafast Topological Phase Switching of Non-Hermitian Photonic System

Sangha Lee, Donghak Oh, Junho Park, Soojeong Baek, Fabian Rotermund, and Bumki Min

(KAIST)

### TS11T\_BP\_3

#### Dynamic Terahertz Polarization Modulation through Fermi-Level Engineering in Graphene

Eunjin Hwang<sup>1</sup>, Sodam Jeong<sup>1</sup>, Dawoon Jo<sup>1</sup>, Kyeongnam Park<sup>1</sup>, Kwang-Seop Kim<sup>1,2</sup>, Jaehyun Kim<sup>1,2</sup>, and Hyeon-Don Kim<sup>1,2</sup>

(<sup>1</sup>KIMM, <sup>2</sup>UST)

### TS11T\_BP\_4

#### Fabrication of Metallic Metasurface Mirrors for Ultrahigh Definition OLED Displays via Nanotransfer Printing

Hyuk-Jun Kang<sup>1,2</sup>, Joo-Yun Jung<sup>2</sup>, Jun-Hyuk Choi<sup>2</sup>, Jihye Lee<sup>2</sup>, Jun-Ho Jeong<sup>2</sup>, and Dae-Geun Choi<sup>1,2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIMM)

### TS11T\_BP\_5

#### Elucidating Plasmon Damping Induced by Chemical and Metal Interface Damping Interplay on Single Ultrathin Pd Shell Gold Nanorods (AuNRs@Pd)

Metya Indah Firmanti and Ji Won Ha

(University of Ulsan)

### TS11T\_BP\_6

#### Polarization-Dependent Plasmon Coupling in Gold Nanorod-Gold Nanosphere Core-Satellite Nanoassemblies

Ina Jeong, Seokhyun Yun, and Sangwoon Yoon

(Chung-Ang University)

**TS11T\_BP\_7**

**Study on Fabricating 3D Pattern Molds for Drawing Lithography using the SPPW Process**

Jun Ho Song, Seok Kim, and Young Tae Cho

*(Changwon National University)*

**TS11T\_BP\_8**

**Morphology-Controllable Wrinkled Hierarchical Structure for Multifunctional Superhydrophobic Platform**

Junseong Ahn<sup>1</sup>, Inkyu Park<sup>2</sup>, and Jun-Ho Jeong<sup>3</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KAIST, <sup>3</sup>KIMM)*

**TS11T\_BP\_9**

**Development of Piezo-Transmittive Mechanical Metamaterial for Self-Powered Strain Sensor**

Junseong Ahn<sup>1</sup>, Ji-Hwan Ha<sup>2</sup>, Sohee Jeon<sup>2</sup>, Inkyu Park<sup>3</sup>, and Jun-Ho Jeong<sup>2</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIMM, <sup>3</sup>KAIST)*

NANO  
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2024  
Symposium

## [TS11] Poster Session 2

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

**TS11T\_P\_1**

**Lightweight Holographic Optical System for Augmented Reality Displays**

Jinsoo Jeong, Byounghyo Lee, and Jisoo Hong

*(KETI)*

NANO  
KOREA  
2024  
Symposium

## [TS11] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS11F\_P\_1

#### Locally Strain-Isolated Substrates for Island-Bridge Stretchable Electronics

Dae Hwan Lee<sup>1</sup> and Taiho Park<sup>2</sup>

(<sup>1</sup>KAERI, <sup>2</sup>POSTECH)

### TS11F\_P\_2

#### Scalable Full-Color Transparent Screen with Plasmonic Molecule Superlattice

HyeokJung Kang<sup>1</sup>, Soon Hyoung Hwang<sup>2</sup>, Sohee Jeon<sup>2</sup>, Jun-Ho Jeong<sup>2</sup>, and Namkyoo Park<sup>1</sup>

(<sup>1</sup>Seoul National University, <sup>2</sup>KIMM)

### TS11F\_P\_3

#### Enhanced Photoelectrochemical Performance of BVO Photoanode through Particle Size Control of BVO Film via Utilizing Thermalcompression Process

Hanyi Lim<sup>1</sup>, Jongbaeg Kim<sup>2</sup>, and Jihye Lee<sup>1</sup>

(<sup>1</sup>KIMM, <sup>2</sup>Yonsei University)

### TS11F\_P\_4

#### Stretchable Green OLEDs on Wavy-Patterned PDMS Substrate via Oxygen Plasma Treatment: Fabrication and Characterization

Jian Cheng Bi, Kyo-Cheol Kang, Jun-Young Park, Seonghyeon Park, Junbeom Song, and Byeong-Kwon Ju

(Korea University)

### TS11F\_P\_5

#### Robust Nanotransfer Printing by Imidization-Induced Interlocking

Gujin Kang<sup>1</sup>, Yongrok Jeong<sup>1</sup>, Inkyu Park<sup>2</sup>, and Jun-Ho Jeong<sup>3</sup>

(<sup>1</sup>KAERI, <sup>2</sup>KAIST, <sup>3</sup>KIMM)

### TS11F\_P\_6

#### Multicolor Holography Generated by Single Metaatom

JinYoung Jeong and Sunae So

(Korea University)

### TS11F\_P\_7

#### **Coupling of Color and Solar Heating in Nanophotonic System**

Suwan Jeon

*(KIMM)*

### TS11F\_P\_8

#### **Dual-Band Camouflage System for Visual and Thermal Adaptation in Different Terrestrial Environments based on Electrochromism**

Jun Seok Choe, Jang Hun Ko, and Bong Hoon Kim

*(DGIST)*

### TS11F\_P\_9

#### **Functional Asymmetrical Films Derived from Binary Polymer Phase Separation for Soft Bioelectronics**

Moonjeong Bok<sup>1,2</sup>, Zhi-Jun Zhao<sup>3</sup>, Soonhyoung Hwang<sup>1</sup>, Sohee Jeon<sup>1</sup>, and Jun-Ho Jeong<sup>1</sup>

*(<sup>1</sup>KIMM, <sup>2</sup>Future Tech Laboratory, <sup>3</sup>Southwest Jiaotong University)*

### TS11F\_P\_10

#### **Application of Chemical-Free Nanotransfer Printing with Wafer-Scale Uniformity and Controllability**

Hyejung Lim<sup>1</sup>, Kisu Kim<sup>1</sup>, Soonhyoung Hwang<sup>2</sup>, Sohee Jeon<sup>2</sup>, Jun-Ho Jeong<sup>2</sup>, Byeong-Kwon Ju<sup>1</sup>, and Sang-Ho Shin<sup>1</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIMM)*

### TS11F\_P\_11

#### **Phase Measurement for Computer Generated Holograms based on Reflection-Type Digital Holographic Microscopy**

Yongjun Lim, Kwan-Jung Oh, and Hyon-Gon Choo

*(ETRI)*

### TS11F\_P\_12

#### **Development of Hologram Printing Downsizing Technology based on Holographic Optical Elements (HOEs)**

Youngmin Kim, Jisoo Hong, Jinsoo Jeong, Byounghyo Lee, YongHwa Kim, Hyeonchan Oh, and Sunghee Hong

*(KETI)*

### TS11F\_P\_13

#### **Wide-Field Synthetic Aperture Reflective Digital Holographic Microscopy**

Minwoo Jung<sup>1</sup>, Gunhee Lee<sup>1</sup>, Hyeonbin Im<sup>1</sup>, Yongjun Lim<sup>2</sup>, and Joonku Hahn<sup>1</sup>

*(<sup>1</sup>Kyungpook National University, <sup>2</sup>Electronics and Telecommunications Research Institute)*



**TS11F\_P\_14**

**Oxide Semiconductor-Based Heterojunction Transistors Exhibiting Negative Differential Transconductance in Multivalued Logic Circuits**

Jaeho Lee and Jeong-Hwan Lee

*(Inha University)*

**TS11F\_P\_15**

**Optimizing the Floating Nanostructure on the Water and its Application: Food Quality Monitoring**

Byung-Ho Kang<sup>1,2</sup>, Junseong Ahn<sup>3</sup>, Ji-Hwan Ha<sup>1,2</sup>, Byungmin Kang<sup>1,2</sup>, Sohee Jeon<sup>2</sup>, Soon Hyoung Hwang<sup>2</sup>, Dae-Geun Choi<sup>2</sup>, Inkyu Park<sup>1</sup>, and Jun-Ho Jeong<sup>2</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>KIMM, <sup>3</sup>Korea University)*

**TS11F\_P\_16**

**3D-Printed Microdevices using Two-Photon Polymerization**

Junhyuk Choi, Yunwoo Lee, Soon-Hyoung Hwang, Sohee Jeon, Dae-Geun Choi, Joo Yeon Jeong, Hyun Min Cho, Jihye Lee, Won-Seok Jang, and Jun-Ho Jeong

*(KIMM)*

**TS11F\_P\_17**

**Numerical Analysis of Rear Ga Gradient Effect for High-Efficiency Thin Cu(In,Ga)Se<sub>2</sub> Solar Cells**

Eun Jeong Jang, Jun Yong Kim, and Yun Seon Do

*(Kyungpook National University)*

**TS11F\_P\_18**

**Holographic AR HUD with Reduced Twin Noise**

Gunhee Lee, Minwoo Jung, Hyeonbin Im, and Joonku Hahn

*(Kyungpook National University)*

**TS11F\_P\_19**

**Fabrication of Large Area Photoanode with BiVO<sub>4</sub>/WO<sub>3</sub> Patterned Nanorod Arrays through Localized Gold Nanoparticle for Efficient Photoelectrochemical Performance**

Hoyoung Lee<sup>1,2</sup>, Hanyi Im<sup>1</sup>, Jun-Hyuk Choi<sup>1</sup>, Jong Hyeok Park<sup>2</sup>, and Jihye Lee<sup>1</sup>

*(<sup>1</sup>KIMM, <sup>2</sup>Yonsei University)*

**TS11F\_P\_20**

**Enhancing Efficiency of Blue Phosphorescent Organic Light Emitting Device using a High Refractive Index Material-Based Light Extraction Layer**

Ji-Sung Lee, Jun-Young Park, Seonghyeon Park, Kyo-Cheol Kang, and Byeong-Kwon Ju

*(Korea University)*

### TS11F\_P\_21

#### Efficient Blue Light Emitting Diodes with Pseudo Halide-passivated CsPb(BrCl)<sub>3</sub>

Jinu Park and Byungha Shin

*(KAIST)*

### TS11F\_P\_22

#### Electrically Tunable Intersubband Polaritonic Metasurfaces with Non-Hermitian Degeneracy

Beomjoon Kim<sup>1</sup>, Hyeongju Chung<sup>1</sup>, Gerhard Boehm<sup>2</sup>, Mikhail A. Belkin<sup>2</sup>, and Jongwon Lee<sup>1</sup>

*(<sup>1</sup>UNIST, <sup>2</sup>Technical University of Munich)*

### TS11F\_P\_23

#### Strong Coupling Effect on Intersubband Polaritonic Metasurfaces using InAs/AlSb Multiple Quantum Well in Short-Wavelength Infrared

Mingyun Kim and Jongwon Lee

*(UNIST)*

### TS11F\_P\_24

#### Exquisite ZnSeTe Blue Quantum Dot LEDs: Extremely Low Tellurium Content and Superb Bandwidth

Seongwoo Cho and Ju Young Woo

*(KITECH)*

### TS11F\_P\_25

#### Ideal WSe<sub>2</sub>/MoS<sub>2</sub> Vertical Heterostructure for High-Performance PN Photodetector

Sung Hyun Kim and Woo Jong Yu

*(Sungkyunkwan University)*

### TS11F\_P\_26

#### Fabrication of Transparent Electret Filter by using Laser Perforation

Hyeonjin Eom<sup>1</sup> and Jong-Eun Park<sup>2</sup>

*(<sup>1</sup>KITECH, <sup>2</sup>The State University of New York Korea)*

# Technical Sessions

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## **[TS12] Sustainable Process and Nanomaterials**

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### **Theme: Process and Nanomaterials for the Sustainability of Advanced Nanotechnologies**

Advances in nanotechnology are bringing advances in a variety of fields, including next-generation solar, hydrogen, displays, biotechnology, and more. At the same time, concern for the environment and the future has led to questions about how to bring these advances into the daily life. This has led us to think about sustainability in terms of processes and nanomaterials, and we will discuss various recent research trends in this area.

## [TS12T5]

### Sustainable Process and Nanomaterials 1

Date & Time	July 4(Thu.), 2024 / 15:40–17:55
Place	Room 209A
Session Chair(s)	Gill Sang Han (KRICT)

#### TS12T5\_I\_1 \*Invited 15:40–16:10

##### Defect Engineering of Metal–Halide Perovskites for Next-Generation Optoelectronic Devices

Hobeom Kim  
(GIST)

#### TS12T5\_I\_2 \*Invited 16:10–16:40

##### Metal Halide Perovskite Quantum Dots as Visible–Light Photocatalyst for Organic Transformation

Sudarsan Tamang  
(Sikkim University)

#### TS12T5\_I\_3 \*Invited 16:40–17:10

##### Highly Stable and Off-State-Free Environmental-Friendly InP/ZnSe/ZnS Quantum Dots Achieved by Wavefunction Engineering

Hye Seon Kim, Yeongcheol Kim, Seongwoo Cho, and Ju Young Woo  
(KITECH)

#### TS12T5\_O\_4 17:10–17:25

##### In Situ Polymerization of Cross-Linked Perovskite-Polymer Composites for Highly Stable and Efficient Perovskite Solar Cells

He Guo and Hyun Suk Jung  
(Sungkyunkwan University)

#### TS12T5\_O\_5 17:25–17:40

##### Completely Annealing-Free Flexible Perovskite Quantum Dot Solar Cells Employing UV-Sintered Ga-Doped SnO<sub>2</sub> Electron Transport Layers

Wooyeon Kim, In Choi, Subin Yu, Seoyeong Lee, Jae Yeon Kim, Jae Won Jang, and Min Jae Ko  
(Hanyang University)

#### TS12T5\_O\_6 17:40–17:55

##### Control of Bulk Defects in MAPbBr<sub>3</sub> Single Crystals via Non-Stoichiometric Reactions for Improving the X-Ray Limit of Detection

Hyemin Lee<sup>1</sup>, Beomjun Park<sup>2</sup>, Jangwon Byun<sup>1</sup>, Man-Jong Lee<sup>2</sup>, and Dong Hoe Kim<sup>1</sup>  
(<sup>1</sup>Korea University, <sup>2</sup>Konkuk University)

**[TS12F6]****Sustainable Process and Nanomaterials 2**

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 09:00–10:30
<b>Place</b>	Room 209A
<b>Session Chair(s)</b>	Uk Sim (KENTECH)

**TS12F6\_I\_1    \*Invited**
**09:00–09:30**
**Core–Shell Structured Mixed Metal Oxide Nanoclusters for Electrocatalytic Applications**

Chan Woo Lee

*(Kookmin University)*
**TS12F6\_I\_2    \*Invited**
**09:30–10:00**
**Catalytic Applications of Water–Soluble Pd Nanoparticles for Sustainable Organic Transformations**

Jan Farag, Ragaa Khalil, Edwin Avila, and Young–Seok Shon

*(California State University Long Beach)*
**TS12F6\_O\_3**
**10:00–10:15**
**Alkaline Seawater Electrolysis: An Unpredicted Dynamic Evolution of Molybdenum in Ni–MoN@NF Electrocatalyst**Shivraj Mahadik<sup>1</sup>, Subramani Surendran<sup>2</sup>, Tae–Hoon Kim<sup>1</sup>, and Uk Sim<sup>2,3</sup>*(<sup>1</sup>Chonnam National University, <sup>2</sup>KENTECH, <sup>3</sup>NEEL Sciences)*
**TS12F6\_O\_4**
**10:15–10:30**
**Efficient Urea Oxidation with Fe Integrated Cu–Based Heterostructure Electrocatalyst: A Sustainable Alternative for Improved H<sub>2</sub> Production**Krishnan Veeramani<sup>1</sup>, Subramani Surendran<sup>2</sup>, Tae–Hoon Kim<sup>1</sup>, and Uk Sim<sup>2,3</sup>*(<sup>1</sup>Chonnam National University, <sup>2</sup>KENTECH, <sup>3</sup>NEEL Sciences)*

## [TS12F7]

### Sustainable Process and Nanomaterials 3

Date & Time	July 5(Fri.), 2024 / 14:00–16:30
Place	Room 209A
Session Chair(s)	Dong Hoe Kim (Korea Univ.)

#### TS12F7\_I\_1 \*Invited 14:00–14:30

##### Fabrication of Cot-Effective Carbon-Based Multiporous-Layered-Electrode Perovskite Solar Cells

Seigo Ito

(University of Hyogo)

#### TS12F7\_I\_2 \*Invited 14:30–15:00

##### Research on Safe Perovskite Solar Cells

Fei Zhang<sup>1,2</sup>

(<sup>1</sup>Tianjin University, <sup>2</sup>Collaborative Innovation Center of Chemical Science and Engineering Tianjin)

#### TS12F7\_I\_3 \*Invited 15:00–15:30

##### Green Processing of Scalable, High-Performance Perovskite Solar Cells and Modules

Young Yun Kim

(KRICT)

#### TS12F7\_I\_4 \*Invited 15:30–16:00

##### Nanomaterials and Sustainable Process for Environmentally Viable Perovskite Solar Cells

Hee Jung Kim and Hyun Suk Jung

(Sungkyunkwan University)

#### TS12F7\_O\_5 16:00–16:15

##### Engineering NiO/NiCO<sub>2</sub>O<sub>4</sub> Heterostructures with Tunable Electronic Effects as Bifunctional Electrocatalysts towards Efficient Water Splitting

Sebastian Cyril Jesudass<sup>1</sup>, Subramani Surendran<sup>2</sup>, Tae Hoon Kim<sup>1</sup>, and Uk Sim<sup>2,3</sup>

(<sup>1</sup>Chonnam National University, <sup>2</sup>KENTECH, <sup>3</sup>NEEL Sciences)

#### TS12F7\_O\_6 16:15–16:30

##### Microwave Assisted Synthesis of C<sub>3</sub>N<sub>4</sub>@TiO<sub>2</sub> Heterojunction for Photocatalytic Degradation of Methylene Blue and Chlortetracycline Hydrochloride

Takhmina Kerim, Kuralay Rustembekkyzy, and Timur Atabaev

(Nazarbayev University)

# [TS12] Poster Session 1

## Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS12W\_BP\_1

#### Doping Strategies for Highly Efficient Electron-Transport-Layer-Free Perovskite Solar Cells

Kelvian T. Mularso, Bonghyun Jo, and Hyun Suk Jung

*(Sungkyunkwan University)*

### TS12W\_BP\_2

#### High-Detectivity of Lead Sulfide Colloidal Quantum Dots for SWIR Photodetectors through an Interfacial Layer Integration

Ha-Chi V. Tran, Eunji Jang, Jugyoung Kim, and Sohee Jeong

*(Sungkyunkwan University)*

### TS12W\_BP\_3

#### Thermally Stable Perovskite Solar Cells

Yu-Na Lee<sup>1</sup>, Thanh-Tuân Bui<sup>2</sup>, and Hui-Seon Kim<sup>1</sup>

*(<sup>1</sup>Inha University, <sup>2</sup>CY Cergy Paris University)*

### TS12W\_BP\_4

#### Lattice Strain Control for Perovskite Solar Cells

YunKyeong Hong, Sanghee Yang, and Hui-Seon Kim

*(Inha University)*

### TS12W\_BP\_5

#### Revisiting the Redox Reactions at Perovskite-Nickel Oxide Interfaces through an Innovative Method of Buried Interface Exposure based on Transfer Printing

Geon Woo Yoon and Hyun Suk Jung

*(Sungkyunkwan University)*

### TS12W\_BP\_6

#### Effect of High-Pressure Hydrogen Annealing on Ultra-Thin ZnO Field Effect Transistor

Hae-Won Lee<sup>1,2</sup>, Minjae Kim<sup>1,2</sup>, Jae Hyeon Jun<sup>1,2</sup>, Chanbin Lee<sup>1,2</sup>, Kyuheon Kim<sup>1,2</sup>, and Byoung Hun Lee<sup>1,2</sup>

*(<sup>1</sup>Center for Semiconductor Technology Convergence, <sup>2</sup>POSTECH)*

### TS12W\_BP\_7

#### Bimetal Nitride Monodisperse Nanoparticles for Efficient Water Oxidation Catalysis

Jeseok Lee, Seohyun Kim, and Kyoungsuk Jin

*(Korea University)*

### TS12W\_BP\_8

#### Tailored Side-Chain in Ionogels for p or n-Type Sustainable Thermoelectrics

Sungryong Kim and Taiho Park

*(POSTECH)*

### TS12W\_BP\_9

#### Impact of the Ultrasonic Dispersion Process Applied to a Cyclohexanol-Based Catalyst Paste on the Pore Structure and Electrochemical Performance of Screen-Printed Proton Exchange Membrane Fuel Cells

Kassim Mendoza, Takeshi Fukuda, Maito Tanabe, Ryuki Tsuji, and Seigo Ito

*(University of Hyogo)*

### TS12W\_BP\_10

#### Ozone-Assisted Hydrothermal Method of Sb-Doped SnO<sub>2</sub> Nanoparticles for Carbon-Free ORR Catalysts in Proton-Exchange-Membrane Hydrogen Fuel Cells

Takeshi Fukuda, Kenji Iimura, Takanori Yamamoto, Ryuki Tsuji, Maito Tanabe, and Seigo Ito

*(University of Hyogo)*

### TS12W\_BP\_11

#### Enhanced Cycling Performance of Aqueous Zinc-Iodine Batteries Utilizing Transition Metal-Zeolite-Embedded Carbon Nanofibers

Yoongu Lim<sup>1</sup>, Gyoung Hwa Jeong<sup>1</sup>, Joon Young Kim<sup>1</sup>, Dae Jun Moon<sup>1</sup>, and Uk Sim<sup>1,2,3</sup>

*(<sup>1</sup>KENTECH, <sup>2</sup>NEEL Sciences, <sup>3</sup>Chonnam National University)*

### TS12W\_BP\_12

#### Ambipolar Nature Accelerates Dual-Functionality on Ni/Ni<sub>3</sub>N@NC for Simultaneous Hydrogen and Oxygen Evolution in Water Splitting System

Gnanaprakasam Janani<sup>1</sup>, Subramani Surendran<sup>1</sup>, Yoongu Lim<sup>1</sup>, Jinuk Choi<sup>1</sup>, and Uk Sim<sup>1,2</sup>

*(<sup>1</sup>KENTECH, <sup>2</sup>NEEL Sciences)*

### TS12W\_BP\_13

#### Interfacial Engineering of CuCo/CuCoO Mott-Schottky Electrocatalyst for High-Performance Sustainable Water Splitting Systems

Subramani Surendran<sup>1</sup>, Gnanaprakasam Janani<sup>1</sup>, Jinuk Choi<sup>1</sup>, and Uk Sim<sup>1,2</sup>

*(<sup>1</sup>KENTECH, <sup>2</sup>NEEL Sciences)*



TS12W\_BP\_14

**In Situ Raman Spectroscopy Investigation of Perovskite  $\text{La}_{0.8}\text{Sr}_{0.2}\text{CrO}_3$  Nanofibers for Oxygen Evolution Reaction in Lithium–Oxygen Batteries**

Myeong–Chang Sung, Byoungjoon Hwang, and Dong–Wan Kim

*(Korea University)*

TS12W\_BP\_15

**Composition Analysis of Particle By-Products Generated from Fluorine Gas–Liquid Metal Reaction for Decomposing Fluorine Gas**

Dabin Lee and Hyeonjin Eom

*(KITECH)*

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## [TS12] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS12T\_BP\_1

#### Study of Dry Autothermal Reforming Process and Catalysts to Treat Flue Gases Directly

JinHee Lee<sup>1</sup>, Tae-Jin Kang<sup>1</sup>, Ji Hyeon Kim<sup>1</sup>, Da-hye Lee<sup>1</sup>, Byung Chan Kwon<sup>2</sup>, No-kuk Park<sup>2</sup>, and Suk-Hwan Kang<sup>1</sup>

(<sup>1</sup>IAE, <sup>2</sup>Yeungnam University)

### TS12T\_BP\_2

#### Sustainable Electrochemical Epoxidation by Metal-Porphyrin Catalysts

Sojin Kim, Dibya Yadav, Eunji Baek, and Kyoungsuk Jin

(Korea University)

### TS12T\_BP\_3

#### Electrochemical Fluorination through Paired Electrolysis of Polytetrafluoroethylene Degradation

Eunjun Lee, Eunji Lim, and Kyoungsuk Jin

(Korea University)

### TS12T\_BP\_4

#### Stretchability and Superior Electronic Property Achieved through Introduction of a Novel Double-Cable Polymer

Dasol Chung and Taiho Park

(POSTECH)

### TS12T\_BP\_5

#### Cathode Designs for the Improved Performances of Next-Generation Aqueous Zinc-Iodine Battery

Yoongu Lim<sup>1</sup>, Gyoung Hwa Jeong<sup>1</sup>, Joon Young Kim<sup>1</sup>, Dae Jun Moon<sup>1</sup>, and Uk Sim<sup>1,2,3</sup>

(<sup>1</sup>KENTECH, <sup>2</sup>NEEL Sciences, <sup>3</sup>Chonnam National University)

## [TS12] Poster Session 2

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30-12:00
<b>Place</b>	Exhibition Hall 4,5

### TS12T\_P\_1

#### **Rationally Designed Eco-Friendly Solvent System for High-Performance, Large-Area Perovskite Solar Cells and Modules**

Yeonkyeong Ju, Nam Joong Jeon, and Young Yun Kim

(KRICT)

### TS12T\_P\_2

#### **Scalable Fabrication of High-Performance Perovskite Solar Modules and their Application to High Power Output Solar Rechargeable Batteries**

So-Min Yoo, Se-Hee Kim, Jungdon Suk, Nam Joong Jeon, and Young Yun Kim

(KRICT)

### TS12T\_P\_3

#### **Hetero-Polytypic Perovskites for Efficient and Stable Perovskite Solar Cells**

Hobeom Kim

(GIST)

### TS12T\_P\_4

#### **Self-Crystallized 2D Perovskites with Carbon Electrodes for Low Temperature Processed Perovskite Solar Cells**

Hobeom Kim

(GIST)

### TS12T\_P\_5

#### **Optimization of CIGS Bandgap Grading for High Performance Perovskite/CIGS Tandem Solar Cell**

Passarut Boonmongkolas<sup>1,2</sup>, Hojin Lee<sup>1</sup>, Jaehyuk Koh<sup>1</sup>, Chaeyeon Kim<sup>1</sup>, Gil Sang Han<sup>2</sup>, and Byungha Shin<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>KRICT)

## [TS12] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS12F\_P\_1

#### Production of Nanocellulose for Eco-Friendly Industry

Aldricho Alpha Pollardo<sup>1</sup>, Yeungchan Kim<sup>1</sup>, Soyeong Yun<sup>2</sup>, Yongwon Seo<sup>2</sup>, Jeong Won Kang<sup>1</sup>, and Ki-Sub Kim<sup>1</sup>

(<sup>1</sup>Korea National University of Transportation, <sup>2</sup>UNIST)

### TS12F\_P\_2

#### A Study on The Manufacture and Analysis of Hydrogel Lenses Containing Ti<sub>3</sub>C<sub>2</sub> MXene with Controlled Particle Size

Seon-Young Park and A-Young Sung

(Daegu Catholic University)

### TS12F\_P\_3

#### Development of Mg(OH)<sub>2</sub> and 5Mg(OH)<sub>2</sub>·MgSO<sub>4</sub>·3H<sub>2</sub>O Synthetic Tuning Method

YeongJo Yun<sup>1</sup>, NuRi Oh<sup>2</sup>, and YooJin Kim<sup>1</sup>

(<sup>1</sup>KICET, <sup>2</sup>Hanyang University)

### TS12F\_P\_4

#### Eco-Friendly Recycling Process of Perovskite Solar Cells by Gelatin-Conjugated Hematite Nanoparticles

Woo SounG Shin, Hee Jung Kim, Oh Yeong Gong, Young Ju Kim, Geon Woo Yoon, and Hyun Suk Jung

(Sungkyunkwan University)

### TS12F\_P\_5

#### Exploring the Fabrication of High-Quality CsPbI<sub>3</sub> Perovskite Thin Films via Solvent Replacement in Vacuum-Assisted Engineering

Si Eun Park, Geon Woo Yoon, and Hyun Suk Jung

(Sungkyunkwan University)

### TS12F\_P\_6

#### Optimizing Top Electrode Design for High Efficiency Perovskite-Silicon Tandem Solar Cell

Seok Beom Kang, Min Ju Jung, Jae Ryoung Lee, Joo Woong Yoon, Jung Jun Kim, Hyemin Lee, Chang Yong Kim, Sangheon Lee, Ayoung Lee, Sang Jun Park, Jun Hong Noh, and Dong Hoe Kim

(Korea University)

**TS12F\_P\_7**

**PbI<sub>2</sub> Modulation by Antisolvent Engineering for Fabrication of High Efficiency Indoor Perovskite Devices**

Jongin Huh, Geon Woo Yoon, and Hyun Suk Jung  
(*Sungkyunkwan University*)

**TS12F\_P\_8**

**Enhancing the Hydrogen Evolution Reaction by Modulating Electronic Structure via Iridium Doping on Ruthenium Phosphide Catalyst**

Kyoungsoon Jung and Dong-wan Kim  
(*Korea University*)

**TS12F\_P\_9**

**Improving Stability and Efficiency of Perovskite Solar Cells via Creatine-Based Passivation Strategies**

Jihyun Min and Taiho Park  
(*POSTECH*)

**TS12F\_P\_10**

**Regulating Crystal Growth of  $\alpha$ -FAPbI<sub>3</sub> with a New Dopant**

Ju-Hye Choi, Yu-Na Kim, and Hui-Seon Kim  
(*Inha University*)

**TS12F\_P\_11**

**Life Cycle Assessment of Green Solvent Process for Perovskite Photovoltaic Device**

Jae Myeong Lee, Hee Jung Kim, and Hyun Suk Jung  
(*Sungkyunkwan University*)

**TS12F\_P\_12**

**Revisiting Compositional Engineering of Wide Bandgap Perovskite Solar Cells**

Wenting Zheng and Jin-Wook Lee  
(*Sungkyunkwan University*)

**TS12F\_P\_13**

**Moth-Inspired Compound Eyes Substrate using Shape Memory Polymer for Improving Efficiency of Perovskite Solar Cells**

Sunwoo Kim, Gain Lee, Moon Kyu Kwak, and Sangwook Lee  
(*Kyungpook National University*)

### TS12F\_P\_14

#### Investigation of Microstructure and Mechanical Properties of Pure Copper and Cu-Nanosized $\text{Al}_2\text{O}_3$ Composite Fabricated by Spark Plasma Sintering

Dinh Van Cong, Dong-Wan Lee, Su-Gwan Lee, and Jin-Chun Kim

*(University of Ulsan)*

### TS12F\_P\_15

#### Roles of Cesium Cation in Inverted Perovskite Solar Cells Investigated via In-Situ Measurements

Dongbo Zhang and Jin-Wook Lee

*(Sungkyunkwan University)*

### TS12F\_P\_16

#### Toxicity Assessment of Irregular Shaped PET Microplastic on Marine Branchiopoda

Lia Kim, Haemi Kim, Yubeen Song, and Youn-Joo An

*(Konkuk University)*

### TS12F\_P\_17

#### Controlled Phase Distribution of Quasi-2D Perovskite Enables Improved Electroluminescence

Ga-Yeong Kim and Jin-Wook Lee

*(Sungkyunkwan University)*

### TS12F\_P\_18

#### Study of Combining First-Principles Simulations and Combinatorial Synthesis for Facile Estimated Exciton Binding Energy in Halide Perovskite-Based Optoelectronic Devices

SangMyeong Lee and Hyun Suk Jung

*(Sungkyunkwan University)*

### TS12F\_P\_19

#### Sn-Pb Perovskite Fabricated via Purification of Tin Iodide for Efficient All-Perovskite Tandem Solar Cells

Mun Young Woo<sup>1</sup>, Jeong Min Im<sup>1</sup>, Sunwoo Kim<sup>2</sup>, Sangwook Lee<sup>2</sup>, and Jun Hong Noh<sup>1</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>Kyungpook National University)*

# Technical Sessions

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## [TS13] Nanofabrication Process and Platform

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**Theme: The Fabrication Processes and Platform Technologies  
Facilitating the Realization and Commercialization of Materials,  
Structures at the Nanoscale, as well as Components and  
Products Derived from Nano-Materials or Structures**

Over the past decades, advancements in nanofabrication processes and platform technologies have played a pivotal role in translating academic breakthroughs into practical or commercial applications across a wide array of nanoscience and technology sectors. In this session, we will discuss in detail the latest trends and progress in technologies associated with nanofabrication processes and platforms.

### [TS13W1]

#### Nanofabrication Process and Platform 1

Date & Time	July 3(Wed.), 2024 / 09:15–10:30
Place	Room 212
Session Chair(s)	Yeong-Eun Yoo (KIMM), Seok-Jae Lee (NNFC)

##### TS13W1\_O\_1

09:15–09:30

##### Large-Scale Molybdenum Carbide Membrane for High-Power EUV Lithography

Yongkyung Kim<sup>1,2</sup>, Jonghyuk Yoon<sup>1,3</sup>, Kihun Seong<sup>1,3</sup>, Heongyu Lee<sup>1</sup>, Hyun-Mi Kim<sup>1</sup>, Seul-Gi Kim<sup>1</sup>, Jinho Ahn<sup>2</sup>, and Hyeongkeun Kim<sup>1</sup>

(<sup>1</sup>KETI, <sup>2</sup>Hanyang University, <sup>3</sup>Sungkyunkwan University)

##### TS13W1\_O\_2

09:30–09:45

##### Large-Scale Pattern Growth through the Extended Replication Mode of Electrohydrodynamic Instability Patterning

Hyunje Park, Heejoon Chae, and Dae Joon Kang

(Sungkyunkwan University)

##### TS13W1\_O\_3

09:45–10:00

##### Optimization of ALD Process through Real-Time By-Product Analysis

Jun-Hyeok Jeon<sup>1,2</sup>, Hyun-Mi Kim<sup>1</sup>, Sung Kyu Jang<sup>1</sup>, Hye-Young Kim<sup>1,2</sup>, Chang-sub Park<sup>3</sup>, Yong Soo Lee<sup>3</sup>, Geun Young Yeom<sup>2</sup>, Jae-Boong Choi<sup>2</sup>, Sun Gil Kim<sup>1</sup>, Seul-Gi Kim<sup>1</sup>, and Hyeongkeun Kim<sup>1</sup>

(<sup>1</sup>KETI, <sup>2</sup>Sungkyunkwan University, <sup>3</sup>KoMiCo Ltd.)

##### TS13W1\_O\_4

10:00–10:15

##### Development of Volatile Block Copolymer Synthetic Platform for Nanostructure Fabrication and its Energy Applications

Jeehyun Hong, Yemin Park, and Yeon Sik Jung

(KAIST)

##### TS13W1\_O\_5

10:15–10:30

##### Direct Growth of Graphite on SiN<sub>x</sub>/Si through Metal Induced Crystallization of Amorphous Carbon for EUV Pellicle

Hyeyoung Kim<sup>1,2</sup>, Seul-Gi Kim<sup>1</sup>, Jun-Hyeok Jeon<sup>1,2</sup>, Yongkyung Kim<sup>1,3</sup>, Kihun Seong<sup>1,2</sup>, Hyeongkeun Kim<sup>1</sup>, Hyun-Mi Kim<sup>1</sup>, and Ji-Beom Yoo<sup>2</sup>

(<sup>1</sup>KETI, <sup>2</sup>Sungkyunkwan University, <sup>3</sup>Hanyang University)



## [TS13W2]

### Nanofabrication Process and Platform 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:55
Place	Room 212
Session Chair(s)	Kwanoh Kim (KIMM), Hyun-Mi Kim (KETI)

<b>TS13W2_I_1</b>	<b>*Invited</b>	<b>15:40–16:10</b>
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**Driving Innovation through Advanced Material Solutions for Micro–Nano–Fabrication**

M. Russew, C. Schuster, A. Voigt, M. Lohse, M. Heinrich, A. Schleunitz, and G. Grützner  
*(micro resist technology GmbH)*

<b>TS13W2_I_2</b>	<b>*Invited</b>	<b>16:10–16:40</b>
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**Laser Processing of Graphene Electrodes for High–Performance Energy Storage Devices**

Soongeun Kwon<sup>1,2</sup>  
*(<sup>1</sup>KIMM, <sup>2</sup>UST)*

<b>TS13W2_I_3</b>	<b>*Invited</b>	<b>16:40–17:10</b>
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**Platform Technology for Enhanced Performance of Contact Electrification Based Electricity Generator**

Dongwhi Choi  
*(Kyung Hee University)*

<b>TS13W2_O_4</b>		<b>17:10–17:25</b>
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**High–Density, Moisture Impermeable TiO<sub>2</sub> Layer Fabricated by an Unconventional Approach**

Jaeun Lim<sup>1</sup>, Jeong–Eun Chae<sup>2</sup>, and Dooho Choi<sup>3</sup>  
*(<sup>1</sup>Dong–Eui University, <sup>2</sup>GERI, <sup>3</sup>Gachon University)*

<b>TS13W2_O_5</b>		<b>17:25–17:40</b>
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**Chemically Altered Ag/ZnO Interface for Remarkable Performance Enhancement of Transparent Electrodes**

Heechang Kim<sup>1</sup>, Jeong–Eun Chae<sup>2</sup>, and Dooho Choi<sup>3</sup>  
*(<sup>1</sup>Dong–Eui University, <sup>2</sup>GERI, <sup>3</sup>Gachon University)*

<b>TS13W2_O_6</b>		<b>17:40–17:55</b>
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**Photo–Cationic Polymerizable Ceramic Slurry for the Fabrication of Ceramic Structures in Vat Polymerization Based Ceramic 3D Printing**

Hye–Yeong Park<sup>1,2</sup>, Yeon–Gil Jung<sup>2</sup>, and SeungCheol Yang<sup>2</sup>  
*(<sup>1</sup>KIMS, <sup>2</sup>Changwon National University)*

[TS13T3]

Nanofabrication Process and Platform 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 212
Session Chair(s)	Do Hyun Kang (KIMM), Su A Park (KIMM)

TS13T3_I_1	*Invited	09:00–09:30
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Bio-MEMS Fabrication Process for Biomedical Application  
Kyoung G. Lee  
(NNFC)

TS13T3_I_2	*Invited	09:30–10:00
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Nano-Stem Cells Therapeutics for High Quality Tissue Regeneration  
Jangho Kim<sup>1,2</sup>  
(<sup>1</sup>Chonnam National University, <sup>2</sup>NANOBIOSYSTEM Co., Ltd.)

TS13T3_O_3		10:00–10:15
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Data-Driven Framework for Gastroesophageal Reflux Disease Diagnosis via pH Sensor Data and Machine Learning  
Songho Lee<sup>1</sup>, Junhyeong Lee<sup>1</sup>, Donggeun Park<sup>1</sup>, Sangkil Lee<sup>2</sup>, Hee Man Kim<sup>2</sup>, and Seunghwa Ryu<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>Yonsei University)

TS13T3_O_4		10:15–10:30
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Multi-Well Array Impedance Biosensor using Semiconductor Process  
SeokGyu Kim, SuGwon Nam, SeongBin Yeon, and Moongyu Jang  
(Hallym University)

## [TS13T4]

## Nanofabrication Process and Platform 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 212
Session Chair(s)	Kyoung G. Lee (NNFC), Sun Min Kim (Inha Univ.)

## TS13T4\_I\_1 \*Invited 14:00–14:30

## Nanofabricated Multiplex Assay Biochip for Simple, Fast, and Accurate Blood Tests in the Microfluidic Platform

Eon Soo Lee<sup>1</sup>, Yudong Wang<sup>1</sup>, and Bharath Babu Nunna<sup>2</sup>*(<sup>1</sup>New Jersey Institute of Technology, <sup>2</sup>Weber State University)*

## TS13T4\_I\_2 \*Invited 14:30–15:00

## Nano Biosensor Platform and Applications of National NanoFab Center

Tae Jae Lee

*(NNFC)*

## TS13T4\_O\_3 15:00–15:15

## Compression-Driven Gating of DNA Transport through Polymer In-Plane Nanopores Fabricated by Nanoimprint Lithography

Ramin Riahipour<sup>1,3</sup>, Junseo Choi<sup>1,3</sup>, Corinne M Martin<sup>1,3</sup>, Steven A. Soper<sup>2,3</sup>, and Sunggook Park<sup>1,3</sup>*(<sup>1</sup>Louisiana State University, <sup>2</sup>University of Kansas, <sup>3</sup>Center for Bio-Modular Multi-Scale Systems for Precision Medicine)*

## TS13T4\_O\_4 15:15–15:30

## Detection of Multiple Foodborne Pathogens Utilizing a Three-Dimensional Nanostructure Swab and Deep Learning-Based Analysis of Raman Spectra

Hyunju Kang<sup>1</sup>, Junhyeong Lee<sup>2</sup>, Jeong Moon<sup>1</sup>, Taegu Lee<sup>2</sup>, Eun-Kyung Lim<sup>1</sup>, Juyeon Jung<sup>1</sup>, Yongwon Jung<sup>2</sup>, Seok Jae Lee<sup>3</sup>, Kyoung G. Lee<sup>3</sup>, Seunghwa Ryu<sup>2</sup>, and Taejoon Kang<sup>1</sup>*(<sup>1</sup>KRIBB, <sup>2</sup>KAIST, <sup>3</sup>NNFC)*

### [TS13T5]

#### Nanofabrication Process and Platform 5

Date & Time	July 4(Thu.), 2024 / 15:40–17:55
Place	Room 212
Session Chair(s)	Hoon-Eui Jung (UNIST), Kyunghoon Kim (Sungkyunkwan Univ.)

##### TS13T5\_I\_1 \*Invited 15:40–16:10

###### The Vacuum Interconnected Nanotech Workstation (Nano-X): A New Paradigm for Nano/Atomic Fabrication

Ting Zhang

(Chinese Academy of Sciences)

##### TS13T5\_I\_2 \*Invited 16:10–16:40

###### Versatile Photonic Crystal Arrays for Colorimetric Sensing

Jae Sung Yoon<sup>1,2</sup>, Nguyen Hoang Minh<sup>1,2</sup>, Kwanoh Kim<sup>1</sup>, Do Hyun Kang<sup>1</sup>, and Yeong-Eun Yoo<sup>1,2</sup>

(<sup>1</sup>KIMM, <sup>2</sup>UST)

##### TS13T5\_I\_3 \*Invited 16:40–17:10

###### Digitizing Soft Machine: Programmable Materials, Structures and Devices

Jiyun Kim

(UNIST)

##### TS13T5\_O\_4 17:10–17:25

###### Anisotropy in Epitaxial Molybdenum Thin Films for Interconnects

Si-Hyeon Joo<sup>1</sup>, Jeong-Eun Chae<sup>2</sup>, and Doocho Choi<sup>3</sup>

(<sup>1</sup>Dong-Eui University, <sup>2</sup>GERI, <sup>3</sup>Gachon University)

##### TS13T5\_O\_5 17:25–17:40

###### Emissivity Calculation Method for Freestanding Nanomembrane

Kihun Seong<sup>1,2</sup>, Yongkyung Kim<sup>1,3</sup>, Hye-Young Kim<sup>1,2</sup>, Jiho Kim<sup>4</sup>, Sangsul Lee<sup>4</sup>, Hyun-Mi Kim<sup>1</sup>, Hyeongkeun Kim<sup>1</sup>, and Seul-Gi Kim<sup>1</sup>

(<sup>1</sup>KETI, <sup>2</sup>Sungkyunkwan University, <sup>3</sup>Hanyang University, <sup>4</sup>POSTECH)

##### TS13T5\_O\_6 17:40–17:55

###### Contact Hole Shrinkage by Resist Flow and Block-Copolymer: A Computational Study

Sang-Kon Kim

(Hongik University)

## [TS13F6]

### Nanofabrication Process and Platform 6

Date & Time	July 5(Fri.), 2024 / 09:00–10:30
Place	Room 212
Session Chair(s)	Jungyul Park (Sogang Univ.)

TS13F6\_I\_1    **\*Invited**    09:00–09:30

#### 3D/4D Printing of Soft Microdevices

Gilgueng Hwang<sup>1,2</sup>

(<sup>1</sup>Paris-Saclay University, <sup>2</sup>The University of Tokyo)

TS13F6\_I\_2    **\*Invited**    09:30–10:00

#### Self-Powered Skin-Mountable Electronics on Soft Platforms

Seungjun Chung

(Korea University)

TS13F6\_O\_3    10:00–10:15

#### Digital Light Processing-Based 3D Printing with Ti-6Al-4V Alloy

Chang Woo Gal<sup>1</sup>, Yeong-Jin Choi<sup>1</sup>, Honghyun Park<sup>1</sup>, and Hui-suk Yun<sup>1,2</sup>

(<sup>1</sup>KIMS, <sup>2</sup>UST)

TS13F6\_O\_4    10:15–10:30

#### DLP-Based Additive Manufacturing Technology for 3D Transparent Yttria Construction

Sinuo Zhang<sup>1,2</sup>, Chang Woo Gal<sup>2</sup>, Young-jin Choi<sup>2</sup>, Ha-Neul Kim<sup>2</sup>, Young-Jo Park<sup>2</sup>, and Hui-suk Yun<sup>1,2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIMS)

[TS13F7]

Nanofabrication Process and Platform 7

Date & Time	July 5(Fri.), 2024 / 14:00–16:30
Place	Room 212
Session Chair(s)	Seoungjun Chung (Korea Univ.), Jae Sung Yoon (KIMM)

TS13F7\_I\_1    \*Invited    14:00–14:30

Direct-Printing More Components onto Large-Area and 3D Electronics  
Jimin Kwon  
(UNIST)

TS13F7\_I\_2    \*Invited    14:30–15:00

Magnetic Nanocomposites for Agile Micro-Robotics  
Jeong Jae Wie  
(Hanyang University)

TS13F7\_I\_3    \*Invited    15:00–15:30

Nanoribbon Yarn with Versatile Inorganic Materials  
Yongrok Jeong<sup>1</sup>, Junseong Ahn<sup>2</sup>, Mingu Kang<sup>3</sup>, Jun-Ho Jeong<sup>4</sup>, and Inkyu Park<sup>3</sup>  
(<sup>1</sup>KAERI, <sup>2</sup>Korea University, <sup>3</sup>KAIST, <sup>4</sup>KIMM)

TS13F7\_O\_4    15:30–15:45

Neuromorphic Computing using Nanofluidic Memristors  
Jaehyun Kim<sup>1</sup>, T.M. Kamsma<sup>2</sup>, KyungJun Kim<sup>1</sup>, W.Q. Boon<sup>2</sup>, C. Spitoni<sup>2</sup>, R. van Roij<sup>2</sup>, and Jungyul Park<sup>1</sup>  
(<sup>1</sup>Sogang University, <sup>2</sup>Utrecht University)

TS13F7\_O\_5    15:45–16:00

Cross-Contamination Free Multi-Ceramic Additive Manufacturing through Calcium Phosphate –  
Bioglass Hierarchical Structure as Potential Bone Defect Recovery  
Imam Akbar Sutejo<sup>1,2</sup>, Sinuo Zhang<sup>1,2</sup>, Shakeel Abbas<sup>1,2</sup>, Muhammad Bilal<sup>1,2</sup>, Chang Woo Gal<sup>1</sup>, Yeong-Jin Choi<sup>1</sup>, Honghyun Park<sup>1</sup>, and Hui-Suk Yun<sup>1,2</sup>  
(<sup>1</sup>KIMS, <sup>2</sup>UST)

TS13F7\_O\_6

16:00–16:15

**Data-Driven Analysis of Chemical Reactions and Process Control Strategies in Fluorine Plasma Environments**

Sung Kyu Jang, Ga In Choi, Sun Gil Kim, Jong Hyun Choi, Jihun Kim, Seul-Gi Kim, Hyun-Mi Kim, Hyeongkeun Kim, and Woosung Lee

(KETI)

TS13F7\_O\_7

16:15–16:30

**Enhancement of Printing Accuracy of Ceramics through a Novel Flashing Process**

Shakeel Abbas<sup>1,2</sup>, Yeong-Jin Choi<sup>2</sup>, Chang Woo Gal<sup>2</sup>, and Hui-suk Yun<sup>1,2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIMS)

NANO  
KOREA  
2024  
Symposium

## [TS13] Poster Session 1      Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS13W\_BP\_1

#### The Impact of Grain Size and Composition on the Mechanical Properties of EUV Pellicle

Won Jin Kim, Haneul Kim, Young Woo Kang, Young Wook Park, and Jinho Ahn

*(Hanyang University)*

### TS13W\_BP\_2

#### Investigation of Selective Growth of Si on Polycrystalline Silicon Substrate

Hoi Yoon Jung, Sung Jun Kim, Jun Hyeong Park, Wang Chul Shin, In-Sung Park, Young Wook Park, and Jinho Ahn

*(Hanyang University)*

### TS13W\_BP\_3

#### EUV Ptychographic Imaging for High-Fidelity Actinic Inspection of Periodic Mask Patterns with EUV Ptychography Microscope

Junho Hong, Dong Gi Lee, Seungchan Moon, and Jinho Ahn

*(Hanyang University)*

### TS13W\_BP\_4

#### Analysis of Optical Constant Region Mitigating Best Focus Shift for High-NA EUV Mask

Seungho Lee, Dongmin Jeong, Yunsoo Kim, and Jinho Ahn

*(Hanyang University)*

### TS13W\_BP\_5

#### Dry Development Process for Vertically Tailored Hybrid Multilayer EUV Photoresist

Ji-Hoo Seok<sup>1</sup>, Jiwon Kim<sup>1</sup>, Hyeonsesik Ji<sup>1</sup>, Jaehyuk Lee<sup>1</sup>, In-Sung Park<sup>1</sup>, Kwangsub Yoon<sup>1,2</sup>, Myung Mo Sung<sup>1</sup>, and Jinho Ahn<sup>1</sup>

*(<sup>1</sup>Hanyang University, <sup>2</sup>Samsung Electronics Co., Ltd.)*

### TS13W\_BP\_6

#### Experimental Investigation of the Mask Diffraction Obstructed by the Critical-Sized Sn Particles on EUV Pellicle

Seungchan Moon, Dong Gi Lee, Junho Hong, and Jinho Ahn

*(Hanyang University)*



#### TS13W\_BP\_7

##### **Improving the Etching Performance of Platinum-Based Alloys for Advanced EUV Mask Absorber**

Yunsoo Kim, Dongmin Jeong, Seungho Lee, and Jinho Ahn

*(Hanyang University)*

#### TS13W\_BP\_8

##### **Control of Oxygen Levels in Cell Chips by Oxygen Expulsion via Tubing**

Jingyeong Yun, Geonho Cho, Tae-Joon Jeon, and Sun Min Kim

*(Inha University)*

#### TS13W\_BP\_9

##### **Oxygen Concentration-Dependent Trophoblast Migration in Microfluidic System**

Hyeonji Cho, Gun Ko, Tae-Joon Jeon, and Sun Min Kim

*(Inha University)*

#### TS13W\_BP\_10

##### **In-Vitro and In-Vivo Quantitative Monitoring of Exerkine APLN for Diagnosis and Treatment of Sarcopenia**

Jisoo Park<sup>1,2</sup>, Gyudong Kim<sup>2</sup>, Jihoon Kim<sup>2</sup>, and Kwan Hyi Lee<sup>1,2</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIST)*

#### TS13W\_BP\_11

##### **Nanostructure-Based Polyaniline Supercapacitor with High Rate Capacitance and Cycle Stability**

Gyumin Kim<sup>1</sup>, Kyoung G. Lee<sup>2</sup>, and Bong gill Choi<sup>1</sup>

*(<sup>1</sup>Kangwon National University, <sup>2</sup>NNFC)*

#### TS13W\_BP\_12

##### **Polyaniline Nanopillar-Based Electrochemical Sensor for Calcium Ion Detection**

Juha Park<sup>1</sup>, Kyoung G. Lee<sup>2</sup>, and Bong Gill Choi<sup>1</sup>

*(<sup>1</sup>Kangwon National University, <sup>2</sup>NNFC)*

#### TS13W\_BP\_13

##### **Sequential Multi-Algorithm Reclassification Technique (SMART) Implemented in a Noninvasive FET Biosensor Enabling Precision Screening of Bladder Cancer**

Hyung Joon Park<sup>1,2</sup>, Sungwook Park<sup>2</sup>, Heekseok Kang<sup>2</sup>, Yukyoung Choi<sup>1,2</sup>, Harin Jin<sup>2</sup>, Seok Jae Lee<sup>3</sup>, Yoo Min Park<sup>3</sup>, Seok Ho Kang<sup>1</sup>, and Kwan Hyi Lee<sup>1,2</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIST, <sup>3</sup>NNFC)*

### TS13W\_BP\_14

#### **Development of an Impedimetric-Based Nanopillar Array Electrode Sensor for Measuring Ion Concentration**

Sung Tae Jang<sup>1</sup>, Seok Ju Won<sup>1</sup>, Kyoung G. Lee<sup>2</sup>, and Bong Gill Choi<sup>1</sup>

(<sup>1</sup>Kangwon National University, <sup>2</sup>NNFC)

### TS13W\_BP\_15

#### **Discrimination of Single Functional-Groups of Neurotransmitters via MOF-Enhanced FET Biosensor**

Hyunro Kim<sup>1,2</sup>, Chanjoon Keum<sup>2</sup>, Sungwook Park<sup>2</sup>, Youngdo Jeong<sup>2</sup>, and Kwan Hyi Lee<sup>1,2</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST)

### TS13W\_BP\_16

#### **Detecting MPXV Viral DNA and Distinguishing Single Mutations in RNA through a Combined CRISPR Sensing System**

Yongjin Lee<sup>1,2</sup>, Seuk-Min Ryu<sup>1</sup>, Seunghwan Bang<sup>2</sup>, Sungwook Park<sup>2</sup>, Hojun Kim<sup>2</sup>, Youngdo Jeong<sup>2</sup>, and Kwan Hyi Lee<sup>1,2</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST)

### TS13W\_BP\_18

#### **Synthesis of Structure-Controlled Transition Metal Phosphide Nanowires**

Jieun Seo, Seohyun Kim, and Hyeukjin Han

(Sungshin Women's University)

### TS13W\_BP\_19

#### **Additive Manufacturing of a Multiplex Colorimetric Detection Microchip for On-Site Foodborne Pathogen Analysis**

Seokwon Heo and Yong Tae Kim

(Tech University of Korea)

### TS13W\_BP\_20

#### **Self-Assembled Bio-Inspired Nanoscale Physical Unclonable Function Labels Utilizing Block Copolymer Techniques**

Janghun Ko, Jun Seok Choe, and Bong Hoon Kim

(DGIST)

## [TS13] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS13T\_BP\_1

#### Development of Nanoscale Pattern Production Technology using Machining and MEMS Process Convergence Technology

Hae In Hwang<sup>1</sup>, In Ho Jo<sup>1</sup>, Yeongeun Yoo<sup>2</sup>, Yong Jun Oh<sup>1</sup>, and Jeong Hwan Kim<sup>1</sup>

(<sup>1</sup>Hanbat National University, <sup>2</sup>KIMM)

### TS13T\_BP\_2

#### The Electrical, Magnetic, and Optical Properties of ZnO on Co Nano-Dot Template via Atomic Layer Deposition for Transparent Electronic Devices

Seung-Hun Lee<sup>1</sup>, Sehwan Song<sup>2</sup>, In Ho Jo<sup>1</sup>, Sungkyun Park<sup>2</sup>, Yeongeun Yoo<sup>3</sup>, Yong Jun Oh<sup>1</sup>, and Jeong Hwan Kim<sup>1</sup>

(<sup>1</sup>Hanbat National University, <sup>2</sup>Pusan National University, <sup>3</sup>KIMM)

### TS13T\_BP\_3

#### Inkjet-Printed Stretchable Thin-Film Transistors with Van Der Waals Heterostructures

Jiwoo Yang<sup>1,2</sup>, Kyungjune Cho<sup>1</sup>, Takhee Lee<sup>2</sup>, Yongtaek Hong<sup>2</sup>, and Seungjun Chung<sup>1</sup>

(<sup>1</sup>Korea University, <sup>2</sup>Seoul National University)

### TS13T\_BP\_4

#### Oxidation and Ellipsometry Method for Molybdenum Thin Film Thickness and Quality Monitoring for EUV Pellicle Applications

Jonghyuk Yoon<sup>1,2</sup>, Heongyu Lee<sup>1</sup>, Yongkyung Kim<sup>1,3</sup>, Kihun Seong<sup>1,2</sup>, Su Min Lee<sup>1,4</sup>, Hyun-Mi Kim<sup>1</sup>, Il Jeon<sup>2</sup>, Hyeongkeun Kim<sup>1</sup>, and Seul-Gi Kim<sup>1</sup>

(<sup>1</sup>KETI, <sup>2</sup>Sungkyunkwan University, <sup>3</sup>Hanyang University, <sup>4</sup>Dankook University)

### TS13T\_BP\_5

#### Enhanced Mo<sub>2</sub>C-Capped Carbon Nanotube Membranes with Atomic Layer Deposition for EUV Lithography

Su Min Lee<sup>1,2</sup>, Yongkyung Kim<sup>1,3</sup>, Jiwon Chung<sup>1</sup>, Jonghyuk Yoon<sup>1,4</sup>, Kihun Seong<sup>1,4</sup>, Sun Gil Kim<sup>1</sup>, Hyun-Mi Kim<sup>1</sup>, Gu Young Cho<sup>2</sup>, Seul-Gi Kim<sup>1</sup>, and Hyeongkeun Kim<sup>1</sup>

(<sup>1</sup>KETI, <sup>2</sup>Dankook University, <sup>3</sup>Hanyang University, <sup>4</sup>Sungkyunkwan University)

**TS13T\_BP\_6**

**Characterization of ALD-Grown Tellurium FETs as a Function of Precursor Pressure**

Kyuheon Kim, Minjae Kim, Hae-Won Lee, and Byoung Hun Lee

*(POSTECH)*

**TS13T\_BP\_7**

**Characterization of Ferroelectric Annealing using Continues Wave-Laser Scanning Annealing (CW-LSA)**

Chan Bin Lee, Seung-Mo Kim, Minjae Kim, and Byoung Hun Lee

*(POSTECH)*

**TS13T\_BP\_8**

**A Study on the Hierarchical Nanostructure for Tactile Sensor**

Nguyen Hoang Minh<sup>1,2</sup>, Kwanoh Kim<sup>1</sup>, Do Hyun Kang<sup>1</sup>, Yeong-Eun Yoo<sup>1,2</sup>, and Jae Sung Yoon<sup>1,2</sup>

*(<sup>1</sup>KIMM, <sup>2</sup>UST)*

**TS13T\_BP\_9**

**Investigating the Impact of Multilayer Structure on the Emissivity of EUV Pellicles**

Young Woo Kang, Haneul Kim, Won Jin Kim, Jungyeon Kim, Young Wook Park, and Jinho Ahn

*(Hanyang University)*

## [TS13] Poster Session 2

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30-12:00
<b>Place</b>	Exhibition Hall 4,5

### TS13T\_P\_1

#### User Switchable Biosensor (USB) Platform for Standardization of Sensor

Jaehee Lee<sup>1</sup>, Seok Jin Hwang<sup>2</sup>, Donggee Rho<sup>1</sup>, Jun Ho Jang<sup>1</sup>, Tae Jae Lee<sup>1</sup>, Seok Jae Lee<sup>1</sup>, Yoo Min Park<sup>1</sup>, Won Chan Seo<sup>2</sup>, Hea Yeon Lee<sup>2</sup>, and Nam Ho Bae<sup>1</sup>

(<sup>1</sup>NNFC, <sup>2</sup>Mara Nanotech Korea, Inc.)

### TS13T\_P\_2

#### Sensitive Detection of Acute Cardiac Disease using Polypyrrole-Based Surface Coating Technique to Stably and Immobilize the Receptor

Jaehee Lee, Jun Ho Jang, Nam Ho Bae, Donggee Rho, and Yoo Min Park

(NNFC)

### TS13T\_P\_3

#### MXene-Based Glass Bio-Interfacing Platform for Precise Analysis of cTnI as an Acute Myocardial Infarction Biomarker

Jaehee Lee, Yonghee Lee, Yeon-Wha Oh, Moon-Keun Lee, Tae Jae Lee, and Yoo Min Park

(NNFC)

### TS13T\_P\_4

#### Long-Term Stable Antibacterial and Biocompatible Polymer Coating on Contact Lenses for the Prevention of Keratitis

Sang Yu Sun<sup>1</sup>, Nahyun Park<sup>1</sup>, Kyoung G. Lee<sup>2</sup>, and Sung Gap Im<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>NNFC)

### TS13T\_P\_5

#### Development of Nanostructure-Based Biosensor Platform by using Improved Gold Etching Process

Donggee Rho, Yoo Min Park, Nam Ho Bae, Kyoung G. Lee, Moon-Keun Lee, and Tae Jae Lee

(NNFC)

## [TS13] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS13F\_P\_1

#### **TiO<sub>2</sub>/MoS<sub>x</sub>/Ag Nanocomposites for Photocatalytic Self-Cleaning Membranes**

Yoonkyung Lee<sup>1</sup>, Teayeop Kim<sup>1</sup>, Sun Choi<sup>2</sup>, and Kyunghoon Kim<sup>1</sup>

(<sup>1</sup>*Sungkyunkwan University*, <sup>2</sup>*KIST*)

### TS13F\_P\_2

#### **An Effective Fabrication Process for the Preparation of Cellulose Nanofibers from Non-Wood Materials**

Jeong Woo Kim, Sivaprakasam Radhakrishnan, and Byoung-Suhk Kim

(*Jeonbuk National University*)

### TS13F\_P\_3

#### **Characterization of Ophthalmic Contact Lens Materials containing All-Trans-Retinoic-Acid and Protein Nanoparticles**

Hye-In Park and A-Young Sung

(*Daegu Catholic University*)

### TS13F\_P\_4

#### **Functional 3D Ionic Semiconductor**

Kyung June Kim, Jaehyun Kim, Joa Jeon, and Jungyul Park

(*Sogang University*)

### TS13F\_P\_5

#### **Synthesis of Metallic Nanoparticles using Eco-Friendly Solvents**

Yeungchan Kim, Jeong Won Kang, and Ki-Sub Kim

(*Korea National University of Transportation*)

### TS13F\_P\_6

#### **Nano-Platform Technology on Micro-Power System: Design of All-Solid State Micro-Batteries and Developing Manufacturing Equipment in NNFC**

Su-Ho Cho, Yong-Hee Lee, Hee Han, Jae Hong Park, and Chi Won Ahn

(*NNFC*)

**TS13F\_P\_7**

**Investigating the Impact of Sidewall Micro-Cavity Structures on Mixing Efficiency in Spiral Micro-Channel Mixers**

Yeun-Jung Jung<sup>1,2</sup>, Kwanoh Kim<sup>1</sup>, Jae-sung Yoon<sup>1,2</sup>, Do-Hyun Kang<sup>1</sup>, and Yeong-Eun Yoo<sup>1,2</sup>

(<sup>1</sup>UST, <sup>2</sup>KIMM)

**TS13F\_P\_8**

**Residual-Layer-Free Nanoimprint Lithography for Reflectance Biosensor Platform**

Junhyoung Ahn<sup>1,2</sup>, Sua Park<sup>1,2</sup>, Hakjong Choi<sup>2</sup>, Soongeun Kwon<sup>2</sup>, Geehong Kim<sup>2</sup>, Hyungjun Lim<sup>2</sup>, Kee-Bong Choi<sup>1,2</sup>, and JaeJong Lee<sup>1,2</sup>

(<sup>1</sup>KRIBB, <sup>2</sup>KIMM)

**TS13F\_P\_9**

**Narrowing Nanogaps between Plasmonic Nanoparticles using Plasma Treatment**

Jeongmin Han and Sangwoon Yoon

(Chung-Ang University)

**TS13F\_P\_10**

**Nanotechnology Based Biomedical Device for COVID-19 POCT**

SeokJin Hwang<sup>1,2</sup>, Zahra Razaei<sup>2,4</sup>, Dong Gee Rho<sup>3</sup>, Nam Ho Bae<sup>3</sup>, Seok Jae Lee<sup>3</sup>, WonChan Seo<sup>1,5</sup>, Su Ryon Shin<sup>4</sup>, Yoo Min Park<sup>3</sup>, and HeaYeon Lee<sup>1,2</sup>

(<sup>1</sup>Mara Nanotech Korea, Inc., <sup>2</sup>Mara Nanotech New York, Inc., <sup>3</sup>NNFC, <sup>4</sup>Harvard Medical School, <sup>5</sup>Pukyong National University)

**TS13F\_P\_11**

**Large-Area (Up to 12 Inches) Nano/Micro Structure Fabrication Utilizing UV-Based Roll-To-Plate Nanoimprint Lithography Process**

Yeon-Wha Oh, Sanghee Jung, Huijae Cho, Suhyeon Kwon, and Il-Suk Kang

(NNFC)

**TS13F\_P\_12**

**Nanoimprint Process based on Shape-Adaptive Stamp for Fabrication of Functional Bio Devices**

Hyungjun Lim<sup>1</sup>, Seokyoung Ji<sup>2</sup>, Hak-Jong Choi<sup>1</sup>, Junhyoung Ahn<sup>1</sup>, Soongeun Kwon<sup>1</sup>, Geehong Kim<sup>1</sup>, Kee-Bong Choi<sup>1</sup>, and Jaejong Lee<sup>1</sup>

(<sup>1</sup>KIMM, <sup>2</sup>Samsung Electronics Co., Ltd.)

**TS13F\_P\_13**

**Numerical Simulation for Optimizing Wafer Level Lens Forming Process**

Doyun Jeon and Seungmo Kim

(KOREATECH)

### TS13F\_P\_14

#### **Self-Assembled Monolayer (SAM) for Cu Diffusion Barrier Depending on Functional Group of SAMs**

Minkyu Lee and Taeyoon Lee

*(Yonsei University)*

### TS13F\_P\_15

#### **Demonstration of Reflective Photoplethysmography Sensors using Quarter Annulus Si Photodiode with Equal Inner and Outer Radii**

Chaehwan Kim<sup>1</sup>, Yeeun Na<sup>1</sup>, Tae Hyun Kim<sup>1</sup>, Soo Hyun Kwon<sup>1</sup>, Il-Suk Kang<sup>1</sup>, Eui-Je Jo<sup>1</sup>, Jong-Bum You<sup>1</sup>, Su-Hyun Kim<sup>1</sup>, Jong Hyun Song<sup>1</sup>, Seung-In Lee<sup>1</sup>, Byung Il Lee<sup>1</sup>, Young Woo Jung<sup>2</sup>, Tae Won Kim<sup>2</sup>, Deok-Ho Cho<sup>3</sup>, and Jongcheol Park<sup>1</sup>

*(<sup>1</sup>NNFC, <sup>2</sup>Partron Co., Ltd., <sup>3</sup>Sigetronics, Inc.)*

### TS13F\_P\_16

#### **Development of Flexible Electrodes with Highly Enhanced Uniformity Utilizing Metal Nanofibers and Conductive Films**

Min Seo Jeong and Hwan-Jin Jeon

*(Tech University of Korea)*

### TS13F\_P\_17

#### **Stretchable and Flexible Electrode based on Semi-Embedded Metal Nanofiber and Wrinkled Film**

Sung Hyeok Lee and Hwan-Jin Jeon

*(Tech University of Korea)*

### TS13F\_P\_18

#### **A Novel Electric Field-Assisted Membrane Process for Nanoparticle Preconcentration and Separation**

Ji Hyo Park<sup>1,2</sup>, Jae Sung Yoon<sup>1</sup>, Do Hyun Kang<sup>1</sup>, Yeong-Eun Yoo<sup>1</sup>, Heung Nam Han<sup>2</sup>, and Kwanoh Kim<sup>1</sup>

*(<sup>1</sup>KIMM, <sup>2</sup>Seoul National University)*

### TS13F\_P\_19

#### **Self-Assembly Behavior of Liquid Crystalline Nanostructures from Surfactant and Tri-Block Copolymer in Aqueous**

Young-Jin Yoon, Sang-Woo Jeon, Dong-Chul Yang, and Tae-Hwan Kim

*(Jeonbuk National University)*

### TS13F\_P\_20

#### **Sensorized Soft Gripper based on Bioinspired Adhesive Fingertips and Pneumatic Control**

Hyeonseok Song, Seongjin Park, and Hoon Eui Jeong

*(UNIST)*



TS13F\_P\_22

**Superhydrophobic and Self-Attachable Conductive Patch based on Microstructure**

Dong Kwan Kang, Seongjin Park, Jaeil Kim, Jinseo Kim, Somi Kim, and Hoon Eui Jeong

*(UNIST)*

TS13F\_P\_24

**Large-Area Molybdenum Disulfide Grown on Flexible Substrate, Compatible with Back-End-of-Line Processes: Enabling High Performance, Low-Power Memristor Applications**

Yu Seong Lee, Arindam Bala, Anamika Sen, and Sun Kook Kim

*(Sungkyunkwan University)*

NANO  
KOREA  
2024  
Symposium



# Technical Sessions

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## **[TS14] Nanometric Metrology and Computation**

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### **Theme: Advanced Characterization and Computation Techniques for Nanomaterials and Nanodevice**

The functionality and reliability of materials and device depend on the capability to delicately control physics and chemistry on an atomic level. Meanwhile, depending on such nanomaterials and nanodevices, nanoscale metrology using microscopic and spectroscopic analysis techniques need to be newly designed and developed. This session covers on (i) physical and chemical principles in materials phenomena and (ii) metrology science to measure the practicality of materials via nanodevice.

### [TS14W2]

#### Nanometric Metrology and Computation 1

Date & Time	July 3(Wed.), 2024 / 15:40–17:45
Place	Room 209B
Session Chair(s)	Si-Young Choi (POSTECH)

##### TS14W2\_I\_2 \*Invited 15:40–16:00

###### Automated Nano-Metrology using AI-Assisted AFM for High-Resolution Material Research

Sang-Joon Cho and Seong-Oh Kim

(Parksystems)

##### TS14W2\_O\_3 16:00–16:15

###### Isostructural Metal-Insulator Transition in Ti-Doped VO<sub>2</sub> Thin Film

Hyeji Sim<sup>1</sup>, Yunkyu Park<sup>1</sup>, Won-Woo Park<sup>2</sup>, Kyung Song<sup>3</sup>, Jaejin Hwang<sup>4</sup>, Jaekwang Lee<sup>4</sup>, Oh-Hoon Kwon<sup>2</sup>, Junwoo Son<sup>1,5</sup>, and Si-Young Choi<sup>1,6</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>UNIST, <sup>3</sup>KIMS, <sup>4</sup>Pusan National University, <sup>5</sup>Seoul National University, <sup>6</sup>IBS)

##### TS14W2\_O\_4 16:15–16:30

###### Controlling Phases in Oxygen Sponge SrFe<sub>1-x</sub>Co<sub>x</sub>O<sub>3-δ</sub>

Hyoungjeen Jeon and Joon Hyuk Lee

(Pusan National University)

##### TS14W2\_I\_5 \*Invited 16:30–17:00

###### Breakdown Behavior of PMTJ Investigated via In-Situ Analytical STEM

Hwanhui Yun<sup>1,2</sup>, Deyuan Lyu<sup>1</sup>, Yang Lv<sup>1</sup>, Brandon R. Zink<sup>1</sup>, Pravin Khanal<sup>3</sup>, Bowei Zhou<sup>3</sup>, Wei-Gang Wang<sup>3</sup>, Jian-Ping Wang<sup>1</sup>, and K. Andre Mkhoyan<sup>1</sup>

(<sup>1</sup>University of Minnesota, <sup>2</sup>KRICT, <sup>3</sup>University of Arizona)

##### TS14W2\_O\_6 17:00–17:15

###### Atomic Structural Dynamics of Ferroelastic Switching in Ferroelectric HfO<sub>2</sub> Freestanding Membrane under Corona Poling

Kyoung-June Go<sup>1</sup>, Min-Su Kim<sup>1</sup>, Kyoungjun Lee<sup>2</sup>, Jun Hee Lee<sup>3</sup>, Seung Chul Chae<sup>2</sup>, and Si Young Choi<sup>1,4</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>Seoul National University, <sup>3</sup>UNIST, <sup>4</sup>IBS)

TS14W2\_O\_7

17:15-17:30

**Cathodoluminescence Nanothermometry in Transmission Electron Microscopy**

Won-Woo Park, Pavel K. Olshin, and Oh-Hoon Kwon

*(UNIST)*

TS14W2\_O\_8

17:30-17:45

**Real-Time TEM Analysis of Li-Ion Battery Dynamics using an Innovative Lithium Injection Probe**

Yu-Jeong Yang, So-Yeon Kim, Abin Kim, Byoungwoo Kang, and Si-Young Choi

*(POSTECH)*

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[TS14T3]

Nanometric Metrology and Computation 2

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 209B
Session Chair(s)	Jaekwang Lee (Pusan Nat'l Univ.)

TS14T3_I_1	<b>*Invited</b>	09:00–09:30
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Emergent Phenomena in Complex Oxide Thin Films  
Hanghui Chen<sup>1,2</sup>  
(<sup>1</sup>NYU Shanghai, <sup>2</sup>New York University)

TS14T3_O_2		09:30–09:45
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Phonon Decoupling in Brownmillerite Structures  
Yeongrok Jin and Jaekwang Lee  
(Pusan National University)

TS14T3_I_3	<b>*Invited</b>	09:45–10:15
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Deep Learning Sub-nm Resolution Crystallographic Mapping of Polycrystalline Doped Hafnium Oxide Thin Films  
Young-Min Kim  
(Sungkyunkwan University)

TS14T3_O_4		10:15–10:30
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Bayesian Optimization-Based Discovery of Element Combinations for Stabilizing Sodium Excess Phase of Na<sub>3</sub>V<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>F<sub>3</sub>  
Sanghyeon Park<sup>1,2</sup>, Chan-Woo Lee<sup>2</sup>, and Jong Min Yuk<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>KIER)

## [TS14T4]

### Nanometric Metrology and Computation 3

Date & Time	July 4(Thu.), 2024 / 14:00–15:30
Place	Room 209B
Session Chair(s)	Yooun Heo (Inha Univ.)

TS14T4_I_1	<b>*Invited</b>	14:00–14:30
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**Emergent Piezoelectric Effect at Engineered Polar Interfaces**

Ming-Min Yang

*(Hefei National Laboratory)*

TS14T4_O_2	14:30–14:45
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**Moiré Charge Localization in Twisted Freestanding Oxide Membranes**Min-Su Kim<sup>1</sup>, Kyoungjun Lee<sup>2</sup>, Kyung Song<sup>3</sup>, Teruyasu Mizoguchi<sup>4</sup>, Ryo Ishikawa<sup>4</sup>, Ki-Tae Eom<sup>2</sup>, Mark S. Rzchowski<sup>2</sup>, Chang-Beom Eom<sup>2</sup>, and Si-Young Choi<sup>1,5</sup>*(<sup>1</sup>POSTECH, <sup>2</sup>University of Wisconsin-Madison, <sup>3</sup>KIMS, <sup>4</sup>University of Tokyo, <sup>5</sup>IBS)*

TS14T4_I_3	<b>*Invited</b>	14:45–15:15
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**Interface Analysis of Nano-Scale Semiconductor Thin Films using Cross-sectional TEM**

Hu Young Jeong

*(UNIST)*

TS14T4_O_4	15:15–15:30
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**Direct Probing of Chalcogen-Driven Atomic-Reconstruction in Thermodynamic Moiré Heterobilayer**Dong-Hwan Yang<sup>1,2</sup>, Kyo-Won Lee<sup>1,2</sup>, Chang-Soo Lee<sup>1</sup>, Moon-Ho Jo<sup>1,2</sup>, and Si-Young Choi<sup>1,2</sup>*(<sup>1</sup>POSTECH, <sup>2</sup>IBS)*

### [TS14T5]

#### Nanometric Metrology and Computation 4

Date & Time	July 4(Thu.), 2024 / 15:40–18:25
Place	Room 209B
Session Chair(s)	Hyoung Jeon Jeon (Pusan Nat'l Univ.)

#### TS14T5\_I\_1 \*Invited 15:40–16:10

##### Nanoscale Temperature Mapping for Operating Devices with Reflection Electron Elastic Energy Thermometry (REET)

Menglong Hao<sup>1,3</sup>, Qiye Zheng<sup>2,3,4</sup>, Ziwen Zhang<sup>1,3</sup>, Yicong Qiu<sup>2</sup>, Yuhang Cai<sup>3</sup>, Xing Xiang<sup>2</sup>, Saad Safiullah<sup>2</sup>, Yanguang Zhou<sup>2</sup>, Junqiao Wu<sup>3,4</sup>, and Chris Dames<sup>3,4</sup>

(<sup>1</sup>Southest University, <sup>2</sup>HKUST, <sup>3</sup>University of California, <sup>4</sup>Lawrence Berkeley National Laboratory)

#### TS14T5\_O\_2 16:10–16:25

##### Comparison DUV to NUV in Atom Probe Tomography based on Different Materials

Chang-Gi Lee, Ijun Rho, and Se-Ho Kim

(Korea University)

#### TS14T5\_O\_3 16:25–16:40

##### Three-Dimensional Polar Topology in Ferroelectric Nanoparticles

Yongsoo Yang<sup>1</sup>, Chaehwa Jeong<sup>1</sup>, Juhyeok Lee<sup>1</sup>, Hyesung Jo<sup>1</sup>, Jaewhan Oh<sup>1</sup>, Hionsuck Baik<sup>2</sup>, Kyoung-June Go<sup>3</sup>, Junwoo Son<sup>3</sup>, Si-Young Choi<sup>3</sup>, Sergey Prosandeev<sup>4</sup>, and Laurent Bellaiche<sup>4</sup>

(<sup>1</sup>KAIST, <sup>2</sup>KBSI, <sup>3</sup>POSTECH, <sup>4</sup>University of Arkansas)

#### TS14T5\_I\_4 \*Invited 16:40–17:10

##### Exploring Quasi-Particle Transport in Polymers

Taeyong Kim

(Seoul National University)

#### TS14T5\_O\_5 17:10–17:25

##### Enhancing Li Kinetics in Truncated Octahedral-Shaped LiNi<sub>0.5</sub>Mn<sub>1.5</sub>O<sub>4</sub> Cathode via Superior LiNbO<sub>3</sub> Coating on {111} Facets

Jeong-Min Kim<sup>1</sup>, Min Seuk Kim<sup>2</sup>, Si Jin Sung<sup>2</sup>, Ji Seul Gi<sup>2</sup>, Sun Sook Lee<sup>2</sup>, Sungho Choi<sup>2</sup>, and Si-Young Choi<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>KRICT)



TS14T5\_O\_6 17:25–17:40

**Site Selectivity of Single Dopant in High-Nickel Cathodes for Lithium-Ion Batteries**

So-Yeon Kim<sup>1</sup>, Yu-Jeong Yang<sup>1</sup>, Eun Gyu Lee<sup>2</sup>, Min-Su Kim<sup>1</sup>, Kyoung-June Go<sup>1</sup>, Minseuk Kim<sup>2</sup>, Gi-Yeop Kim<sup>1</sup>, Sungho Choi<sup>2</sup>, and Si-Young Choi<sup>1,3</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>KRICT, <sup>3</sup>IBS)

TS14T5\_O\_7 17:40–17:55

**Nanostructured Reference Materials for Nano Measurement by SEM and AFM**

Kyung Joong Kim

(Kims Reference Corp.)

TS14T5\_I\_8 \*Invited 17:55–18:25

**Exploration of Nanoscale Functionalities of Complex Oxides via Scanning Probe Microscopy**

Yoon Heo

(Inha University)

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### [TS14F6]

#### Nanometric Metrology and Computation 5

Date & Time	July 5(Fri.), 2024 / 09:00–10:30
Place	Room 209B
Session Chair(s)	Hyejin Jang (Seoul Nat'l Univ.)

#### TS14F6\_I\_1 \*Invited 09:00–09:30

##### Oxide-Based Solid-State Electrochemical Thermal Transistors

Hiromichi Ohta

(Hokkaido University)

#### TS14F6\_O\_2 09:30–09:45

##### Solid-State Thermal Transistors with Switching Width of 9.5 W/mK

Ahrong Jeong<sup>1</sup>, Mitsuki Yoshimura<sup>1</sup>, Zhiping Bian<sup>1</sup>, Jason Tam<sup>2</sup>, Bin Feng<sup>2</sup>, Yuichi Ikuhara<sup>2</sup>, Yusaku Magari<sup>1</sup>, Takashi Endo<sup>1</sup>, Yasutaka Matsuo<sup>1</sup>, and Hiromichi Ohta<sup>1</sup>

(<sup>1</sup>Hokkaido University, <sup>2</sup>The University of Tokyo)

#### TS14F6\_O\_3 09:45–10:00

##### Thermal Conductivity of Beta Phase Gallium Oxide from First-Principles

Jaejin Hwang and Jaekwang Lee

(Pusan National University)

#### TS14F6\_O\_4 10:00–10:15

##### Diffusion and Interface Control Growth in Molybdenum Disulfide Microstructure

Chang-Won Choi<sup>1,2</sup>, Min-Yeong Choi<sup>1,2</sup>, Cheol-Joo Kim<sup>1,2</sup>, and Si-Young Choi<sup>1,2</sup>

(<sup>1</sup>IBS, <sup>2</sup>POSTECH)

#### TS14F6\_O\_5 10:15–10:30

##### Analyzing Atomical Strain on the Effect of Thermodynamic Factors at MoS<sub>2</sub> Mirror Twin Boundary Transition

Sung-Hyuk Her, Dong-Hwan Yang, Heonsu Ahn, Moon-Ho Jo, and Si-Young Choi

(POSTECH)

# [TS14] Poster Session 1

## Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS14W\_BP\_1

#### Exploring Nanoscale Polymer Viscoelasticity: Advancements in nanoDMA Techniques

Sang-Jun Gim, Dae-Yeon Won, Sung-Oh Kim, Byoung-Woon Ahn, and Sang-Joon Cho  
(Parksystems)

### TS14W\_BP\_2

#### Photo-Induced Force Microscopy Integration with In-Line AFM: Advancements and Applications

Jin-Young Na, Hyun Hwangbo, Byoung-Woon Ahn, and Sang-Joon Cho  
(Parksystems)

### TS14W\_BP\_3

#### Deep Learning-Embedded 4D-STEM Crystallographic Mapping of Polymorphic Phase Distribution in Polycrystalline Oxide Thin Films

Sang-Hyeok Yang, Young-Hoon Kim, Min-Hyoung Jung, and Young-Min Kim  
(Sungkyunkwan University)

### TS14W\_BP\_4

#### Few Images-Based High-Resolution Electron Tomography of Porous Carbon Supports with Deep Learning Interpolation

Yerin Jeon, Sang-Hyeok Yang, Eun-Byeol Park, Min-Hyoung Jung, and Young-Min Kim  
(Sungkyunkwan University)

### TS14W\_BP\_5

#### A Comparative Study of Singleslice and Multislice Electron Ptychography for Enhanced Visualization of Light Elements

Semin Cheon and Yongsoo Yang  
(KAIST)

### TS14W\_BP\_6

#### Revealing the Complex Polar Topology of Nanoscale Ferroelectrics via Atomic Electron Tomography

Chaehwa Jeong<sup>1</sup>, Juhyeok Lee<sup>1,2</sup>, Hyesung Jo<sup>1</sup>, Jaewhan Oh<sup>1</sup>, Hionsuck Baik<sup>3</sup>, Kyoung-June Go<sup>4</sup>, Junwoo Son<sup>5</sup>, Si-Young Choi<sup>4,6</sup>, Sergey Prosandeev<sup>7</sup>, Laurent Bellaiche<sup>7</sup>, and Yongsoo Yang<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>Lawrence Berkeley National Laboratory, <sup>3</sup>KBSI, <sup>4</sup>POSTECH, <sup>5</sup>Seoul National University, <sup>6</sup>IBS, <sup>7</sup>University of Arkansas)

### TS14W\_BP\_7

#### Deep Learning-Assisted Structural Domain Analysis of Domain-Mediated Functional Materials

Seon Je Kim<sup>1</sup>, Hyeon-Ah Ju<sup>1</sup>, Young-Min Kim<sup>1</sup>, and Hu Young Jeong<sup>2</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>UNIST)

### TS14W\_BP\_8

#### Defect-Mediated Stabilization of HfO<sub>2</sub>

Yeongrok Jin, Minche Jo, and Jaekwang Lee

(Pusan National University)

### TS14W\_BP\_9

#### Two-Dimensional Electron Confinement in Antipolar Ordered Metallic SrFeO<sub>3</sub>

Jaejin Hwang, Do Hyeon Hwang, and Jaekwang Lee

(Pusan National University)

### TS14W\_BP\_10

#### Inducing Ferroelectric Phase Transition in SrFe<sub>12</sub>O<sub>19</sub> through Biaxial Compressive Strain

Seungjae Hwang, Yeongrok Jin, Jaejin Hwang, and Jaekwang Lee

(Pusan National University)

### TS14W\_BP\_11

#### Evaluation of Thermal Transport Properties of Thermal Interface Materials for Semiconductor Devices

Jaehyung Song, Hyun Woo, and Hyejin Jang

(Seoul National University)

### TS14W\_BP\_12

#### Phonon Thermal Conductivity of Magnesium Oxide Particle Fillers for Thermal Management

Yeojin Lee, Hyun Woo, and Hyejin Jang

(Seoul National University)

### TS14W\_BP\_13

#### Thermal Conductivity of Gallium Oxide (Ga<sub>2</sub>O<sub>3</sub>) Films and Wafers Characterized by Time-Domain Thermoreflectance

Byoungjoon Lee, Byoung Soo Kim, Ho Won Jang, and Hyejin Jang

(Seoul National University)

### TS14W\_BP\_14

#### Thermal Transport Properties of Chiral Two-Dimensional Hybrid Organic Inorganic Perovskites

Jeongwook An<sup>1</sup>, Wonsik Lee<sup>1</sup>, Sang Hyun Nam<sup>2</sup>, Jin Kyu Lee<sup>2</sup>, Young-Hoon Kim<sup>2</sup>, and Hyejin Jang<sup>1</sup>

(<sup>1</sup>Seoul National University, <sup>2</sup>Hanyang University)

**TS14W\_BP\_15**

**Electron Paramagnetic Resonance (EPR) Simulation for a-IGZO**

Seongmun Kim, Yeongrok Jin, and Jaekwang Lee

*(Pusan National University)*

**TS14W\_BP\_16**

**Anharmonic Effects on Phonon Dispersion**

Kwanhong Park, Jaejin Hwang, Yeongrok Jin, and Jaekwang Lee

*(Pusan National University)*

**TS14W\_BP\_17**

**Magnetocaloric Effect of FeNiMn Operating Near Room Temperature**

Chang-Gi Lee<sup>1</sup>, TaeHyeok Kang<sup>2</sup>, Pyuck-Pa Choi<sup>2</sup>, and Se-Ho Kim<sup>1</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KAIST)*

**TS14W\_BP\_18**

**Enhancing Synthesis Methodology for High-Capacity Prussian White Cathodes in Sodium-Ion Batteries**

Jaeeun Joo and Jong Min Yuk

*(KAIST)*

**TS14W\_BP\_19**

**Cathodoluminescence Nanothermometry in In Situ Transmission Electron Microscopy using Boltzmann Energy Distribution**

Pavel K. Olshin, Won-Woo Park, Ye-Jin Choi, and Oh-Hoon Kwon

*(UNIST)*

**TS14W\_BP\_20**

**In-Situ Liquid Cell TEM Study for Water Splitting with Hetero-Nanostructured Materials**

V. Navakoteswara Rao, Jung Ho Yoo, and Jun-Mo Yang

*(NNFC)*

## [TS14] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS14T\_BP\_1

#### Design of a Toy Cell System Including a Lithium-Source to Analyze In-Situ Lithium Electrodeposition Morphology on Electrode

Kyu-Min Jo, Yu-Jeong Yang, Abin Kim, Byoungwoo Kang, and Si-Young Choi  
(POSTECH)

### TS14T\_BP\_2

#### Real-Time Imaging of Polar Domain Dynamics in Multilayer WTe<sub>2</sub> via Operando TEM

Seungho Hong and Hyobin Yoo  
(Sogang University)

### TS14T\_BP\_3

#### Investigating OLED Cell Characteristics using Imaging Spectroscopic Ellipsometry: Lateral Resolution, Thickness, and Thickness Uniformity

Mangesh Diware<sup>1</sup>, Yoon-Shik Kang<sup>1</sup>, Minjun Kim<sup>2</sup>, GaYoon Jeong<sup>1</sup>, Jeonghun Kwak<sup>2</sup>, Yong Woon Lim<sup>1</sup>, Ahjin Jo<sup>1</sup>, and Sang-Joon Cho<sup>1</sup>  
(<sup>1</sup>Parksystems, <sup>2</sup>Seoul National University)

### TS14T\_BP\_4

#### Thermal Transport Properties of Ni-Containing High-Entropy Alloys at Elevated Temperatures (< 850 K)

Byungjun Kang, Dongwhan Kim, Chan Park, Eun Soo Park, and Hyejin Jang  
(Seoul National University)

### TS14T\_BP\_5

#### Structural Characterization of Micrometer-Scaling Cu Single Crystals Grown by Electrochemical Method

Giho Jeong and Jae Yong Song  
(POSTECH)

TS14T\_BP\_6

**High Performance Neuromorphic Device of Ferroelectric  $\text{Hf}_{0.7}\text{Zr}_{0.3}\text{O}_2/\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$  Heterostructure by Inhomogeneous Polarization Reversal and Defect Engineering**

Joonbong Lee<sup>1</sup>, Hojin Lee<sup>1,2</sup>, Hyewon Lee<sup>1,2</sup>, Ayoung Cho<sup>1</sup>, Jinhong Park<sup>1</sup>, Yurim Lee<sup>1</sup>, Cheongwon Kim<sup>1</sup>, Kwang Heo<sup>1</sup>, Sungkyu Kim<sup>1</sup>, and Taekjib Choi<sup>1</sup>

(<sup>1</sup>Sejong University, <sup>2</sup>Samsung Electronics Co., Ltd.)

TS14T\_BP\_7

**Exploring Eddy Current in Electrical Steels at the Nansocale**

Jinyoung You and Yunseok Kim

(Sungkyunkwan University)

TS14T\_BP\_8

**AFM-Based EUV Mask Defect Repair System**

Ki-Young Jung, Min Seok Gu, Byoung-Woon Ahn, and Sang-Joon Cho

(Parksystems)

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## [TS14] Poster Session 3

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

### TS14F\_P\_1

#### Crystal Orientation-Dependent Oxygen Evolution Activity in IrO<sub>2</sub>

Gahee Noh<sup>1</sup>, Tae Gyu Yun<sup>2</sup>, Sung-Yoon Chung<sup>2</sup>, Chang-Beom Eom<sup>3</sup>, and Si-Young Choi<sup>1,4</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>KAIST, <sup>3</sup>University of Wisconsin-Madison, <sup>4</sup>IBS)

### TS14F\_P\_2

#### Three-Dimensional Pore Structure Analysis in Cu-Cu Bonding

Eun-Byeol Park<sup>1</sup>, Min-Hyoung Jung<sup>1</sup>, Young-Hoon Kim<sup>1</sup>, Su Jae Kim<sup>2</sup>, Se-Young Jeong<sup>2,3</sup>, and Young-Min Kim<sup>1</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Pusan National University, <sup>3</sup>Massachusetts General Hospital and Harvard Medical School)

### TS14F\_P\_3

#### Extremely Low Thermal Conductivity of Disordered, Layered Graphite Fluoride (CxF)

Wonsik Lee, Donghoon Moon, Seungbin Han, Gwan-Hyoung Lee, and Hyejin Jang

(Seoul National University)

### TS14F\_P\_4

#### Enhancing the Ionic Conductivity of a Layered Type Sodium Ion Solid Electrolyte by Substituting Trivalent Cation

Junki Lee, Jacob Choe, and Jong Min Yuk

(KAIST)

### TS14F\_P\_5

#### Direct Imaging of Co-CUK-1 Framework with H<sub>2</sub>O Guests

Kyo-Won Lee<sup>1,2</sup>, Dong-Hwan Yang<sup>1,2</sup>, and Si-Young Choi<sup>1,2</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>IBS)

### TS14F\_P\_6

#### Domain Orientated Nanoparticle Exsolution in Defect Engineered Stannate Perovskite

Yeon-Seo Nam<sup>1</sup>, Hyeji Sim<sup>1</sup>, Yujeong Lee<sup>2</sup>, Daseob Yoon<sup>2</sup>, Junwoo Son<sup>2</sup>, and Si-Young Choi<sup>1,3</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>Seoul National University, <sup>3</sup>IBS)



**TS14F\_P\_7**

**Application of Ion Milling for Quantitative Mesoscale Microstructure**

Kyung-Won Lim<sup>1</sup>, Joo-Hee Kang<sup>1</sup>, Kyung-Seok Han<sup>2</sup>, Eun-Young Kim<sup>1</sup>, and Kyung Song<sup>1</sup>

(<sup>1</sup>KIMS, <sup>2</sup>JEOL Korea)

**TS14F\_P\_8**

**Microstructure Characterization and Cracking Behavior of 625 Alloys**

Gun young Yoon and Ihho Park

(KIMS)

**TS14F\_P\_9**

**Direct Mapping of Ionomer Distribution on Porous Carbon Supports by Machine Learning EELS Clustering**

Daehee Yang, Young-Hoon Kim, and Young-Min Kim

(Sungkyunkwan University)

**TS14F\_P\_10**

**Enhanced Resolution of AFM Images using Deep Learning**

Jintae Moon, Panithan Sriboriboon, and Yunseok Kim

(Sungkyunkwan University)

**TS14F\_P\_12**

**Observing the 3D Atomic Arrangement of Twinned Metallic Nanoparticles and their Catalytic Properties**

Yongsoo Yang, Juhyeok Lee, Chaehwa Jeong, Taegu Lee, and Seunghwa Ryu

(KAIST)

**TS14F\_P\_13**

**Influence of Wall Thickness on the Piezoelectric Effect of Hexagonal Pb(Zr,Ti)O<sub>3</sub> Nanotube**

Eun Young Kim, Sam Yeon Cho, and Sang Don Bu

(Jeonbuk National University)

**TS14F\_P\_14**

**Micro Probe System for In-Situ X-Ray Scattering**

Hyoungjeen Jeon<sup>1</sup>, Yunhyeong Jang<sup>2</sup>, Hakbeom Moon<sup>2</sup>, Joon Hyuk Lee<sup>1</sup>, Sangkyun Ryu<sup>1</sup>, Yeongdeuk Mun<sup>1</sup>, HyunJung Kim<sup>1</sup>, and Jin Hyung Cho<sup>1</sup>

(<sup>1</sup>Pusan National University, <sup>2</sup>NEXTRON)



# Technical Sessions

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## **[TS15] Nanotechnology in EHS(Environment, Health, Safety) & Standardization**

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### **Theme: New Trends in Nanotechnology: EHS(Environment, Health, Safety) & Standardization**

Recent developments in nanosciences and nanotechnology have led to the commercialization and incorporation of an increasing number of nanoproducts into our daily life. Since we don't fully understand the risks that these new technologies pose, there are growing concerns about how they will affect people's health and the environment. For instance, there are increasing concerns on the effects of micro- and nano- sized plastics in the environment and human health, while developments and applications of novel 2D nanomaterials request urgent development of innovative assessment technologies for these advanced materials. In this session, we'll offer forums for discussing about important issues related to the nanosafety, standardization, and nano ESG that can help development of safe and sustainable nanotechnologies.

### [TS15W1]

#### Nanotechnology in EHS(Environment, Health, Safety) & Standardization I

Date & Time	July 3(Wed.), 2024 / 09:00-10:30
Place	Room 307
Session Chair(s)	June-Woo Park (KIT)

#### TS15W1\_I\_1 \*Invited 09:00-09:30

##### Efficiency of Embryonic Zebrafish Model in Toxicology: Toxicity of Nanoparticles

Kitae Kim

(Seoul National University of Science and Technology)

#### TS15W1\_I\_2 \*Invited 09:30-10:00

##### Synthesis of Surface Engineered Quantum Dots for Optoelectronic and Biological Applications

Jongnam Park

(UNIST)

#### TS15W1\_O\_3 10:00-10:15

##### Electronic Structure Analysis of Cobalt Based Oxide using LowDose Monochromated STEM-EELS

Jong Hyeok Seo<sup>1,2</sup>, Joon Yong Park<sup>3</sup>, Ki Min Nam<sup>3</sup>, Sang Jung Ahn<sup>1,2</sup>, Soo Heyong Lee<sup>1,2</sup>, Joo Hyun Lee<sup>1</sup>, Hyun Ruh<sup>1</sup>, and Ji-Hwan Kwon<sup>1,2</sup>

(<sup>1</sup>KRISS, <sup>2</sup>UST, <sup>3</sup>Pusan National University)

#### TS15W1\_O\_4 10:15-10:30

##### Modification of Multi-Walled Carbon Nanotubes Toxicity by Prolonged Aging in Aqueous Phase

Youn-Joo Jung<sup>1</sup>, Thillaichidambaram Muneeswaran<sup>2</sup>, Jin Soo Choi<sup>1</sup>, Sumin Kim<sup>3</sup>, Jong Hun Han<sup>3</sup>, Wan-Seob Cho<sup>2</sup>, and June-Woo Park<sup>1,4</sup>

(<sup>1</sup>KIT, <sup>2</sup>Dong-A University, <sup>3</sup>Chonnam National University, <sup>4</sup>UST)

## [TS15W2]

## Nanotechnology in EHS(Environment, Health, Safety) &amp; Standardization 2

Date & Time	July 3(Wed.), 2024 / 15:40–17:40
Place	Room 307
Session Chair(s)	Young Jun Kim (KIST-Europe)

## TS15W2\_I\_1 \*Invited 15:40–16:10

## CHIASMA, INSIGHT and PINK: An European Approach to Animal-Free Safe and Sustainable by Design

T. Serchi<sup>1</sup>, E. Arnesdotter<sup>1</sup>, P. Weber<sup>1</sup>, A. Marvuglia<sup>1</sup>, B. Beccari Barreto<sup>1</sup>, P. Isigonis<sup>1</sup>, D. Greco<sup>2</sup>, A. Serra<sup>2</sup>, L. Saarimäki<sup>2</sup>, T. Exner<sup>3</sup>, J. Dokler<sup>3</sup>, and S. Friedrichs<sup>4</sup>

(<sup>1</sup>Luxembourg Institute of Science and Technology, <sup>2</sup>Tampere University, <sup>3</sup>Seven Past Nine,

<sup>4</sup>AcumenIST SRL)

## TS15W2\_I\_2 \*Invited 16:10–16:40

An Optimization of Bronchoalveolar Lavage Fluid (BALF) Analysis Methods for Inhalation Toxicity Testing of Nanomaterials: Importance of Standardization and Efforts to Develop ISO International Standard Test Methods

Somin Lee<sup>1</sup>, Seung Han Lee<sup>1</sup>, Kyung Seuk Song<sup>1</sup>, Soyeon Jeon<sup>2</sup>, Gyuri Kim<sup>2</sup>, and Wan Soeb Cho<sup>2</sup>

(<sup>1</sup>KCL, <sup>2</sup>Dong-A University)

## TS15W2\_O\_3 16:40–16:55

Exploring Time-Dependent Cellular Diversity in 3D Lung Models Exposed to Silver Nanoparticles through Single Cell Analysis

Eunseo Lee<sup>1</sup>, Seung-Min Ha<sup>1</sup>, Seung-geun Park<sup>1</sup>, and Tae Hyun Yoon<sup>1,2</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>Yoon Idea Lab Co., Ltd.)

## TS15W2\_O\_4 16:55–17:10

Presentation of Nanomaterial Grouping Methodology based on NanoApp

Bogyeoum Choi<sup>1</sup>, Sanghun Kim<sup>1,2</sup>, Marie-Leonie Bohlen<sup>2</sup>, and Hyun Pyo Jeon<sup>1,2</sup>

(<sup>1</sup>Kyungsoo University, <sup>2</sup>The Safe Europe)

## TS15W2\_I\_5 \*Invited 17:10–17:40

Active Biohybrid Matters for Fights Against Infection and Pollution

Hyunjoon Kong

(The University of Illinois at Urbana-Champaign)

### [TS15T3]

#### Nanotechnology in EHS(Environment, Health, Safety) & Standardization 3

Date & Time	July 4(Thu.), 2024 / 09:00–10:30
Place	Room 307
Session Chair(s)	Tae Hyun Yoon (Hanyang Univ.)

##### TS15T3\_I\_1 \*Invited 09:00–09:30

#### Understanding the Nanomaterial Interaction with Biomolecules, a Journey from Safety to Applications in Modern Medicine

Monopoli P Monopoli

(RCSI University of Medicine and Health Sciences)

##### TS15T3\_I\_2 \*Invited 09:30–10:00

#### Ceria-Based Therapeutic Antioxidants for Radioprotection

Min Soh

(HyeonTechNBio, Inc.)

##### TS15T3\_O\_3 10:00–10:15

#### Infrared Nano-Spectroscopy of Single Extracellular Vesicles via PhotoInduced Force Microscopy

Mingu Kang<sup>1,2</sup>, Hwi Je Woo<sup>1</sup>, Eun Seong Lee<sup>1</sup>, and Junghoon Jahng<sup>1</sup>

(<sup>1</sup>KRISS, <sup>2</sup>POSTECH)

##### TS15T3\_O\_4 10:15–10:30

#### Nano-QSTR Model to Support Safe and Sustainable by Design on Advanced Nanomaterials

Hyun Kil Shin and Seokjoo Yoon

(KIT)

## [TS15T4]

### Nanotechnology in EHS(Environment, Health, Safety) & Standardization 4

Date & Time	July 4(Thu.), 2024 / 14:00-15:30
Place	Room 307
Session Chair(s)	Tae Geol Lee (KRISS)

<b>TS15T4_I_1</b>	<b>*Invited</b>	<b>14:00-14:30</b>
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**Global Collaborations and Research to Address the Knowledge Gaps in Regulatory Science for Micro and Nanoplastics**

Anil K. Patri  
(FDA)

<b>TS15T4_I_2</b>	<b>*Invited</b>	<b>14:30-15:00</b>
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**Generation of Nano- and Microplastic from Thermoplastics by Solar Simulated Photooxidation and Mechanical Abrasion**

Soeun Eo<sup>1</sup>, Young Kyoung Song<sup>1,2</sup>, Sang Hee Hong<sup>1</sup>, and Won Joon Shim<sup>1</sup>  
(<sup>1</sup>KIOST, <sup>2</sup>Chonnam National University)

<b>TS15T4_I_3</b>	<b>*Invited</b>	<b>15:00-15:30</b>
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**Maternal Nanoplastic Ingestion Induces an Increase in Offspring Body Weight through Altered Lipid Species and Microbiota**

Da Yong Lee  
(KRIBB)

### [TS15T5]

#### Nanotechnology in EHS(Environment, Health, Safety) & Standardization 5

Date & Time	July 4(Thu.), 2024 / 15:40-17:55
Place	Room 307
Session Chair(s)	Kyung Seuk Song (KCL)

##### TS15T5\_I\_1 \*Invited 15:40-16:10

**Advancing Nanotechnology in Industry: Standardization Challenges and Opportunities in Surface-Enhanced Raman Scattering for Molecular Detection**

Hee-Kyung Na  
(KRISS)

##### TS15T5\_I\_2 \*Invited 16:10-16:40

**Capability and Competitiveness of Top 188 Companies Active in Nanotechnology**

Won-Kyu Park  
(Sungkyunkwan University)

##### TS15T5\_O\_3 16:40-16:55

**EU Potential Project: A Platform to Assess Nanomaterial Safety for Rapid Commercialization**

Tommaso Sechi<sup>1</sup>, Aline Chary<sup>1</sup>, Luisa Diomedea<sup>2</sup>, Ada De Luigi<sup>2</sup>, Fabio Fiordaliso<sup>2</sup>, and Paolo Bigini<sup>2</sup>  
(<sup>1</sup>Luxembourg Institute of Science and Technology, <sup>2</sup>Istituto di Ricerche Farmacologiche Mario Negri IRCCS)

##### TS15T5\_I\_4 \*Invited 16:55-17:25

**Copper Sulfide Electrodes for Electronic and Optoelectronic Applications**

Sangyeon Pak  
(Hongik University)

##### TS15T5\_I\_5 \*Invited 17:25-17:55

**Defect Removal of 2D Semiconductors by Fixating Chemisorbed Oxygen Molecules via h-BN Encapsulations**

Chang-Hee Cho  
(DGIST)



# [TS15] Poster Session 1

## Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS15W\_BP\_1

#### High-Performance Insulating EMI Shielding Film using $\text{Ti}_3\text{C}_2/\text{Sr}_2\text{Nb}_3\text{O}_{10}$ Blends

Eunjung Lee<sup>1,2</sup>, Jong Sung Kim<sup>1,2</sup>, Jong Hyuk Park<sup>2</sup>, and Kyungjune Cho<sup>2</sup>

(<sup>1</sup>Korea University, <sup>2</sup>KIST)

### TS15W\_BP\_2

#### Preparation of Environmentally Relevant Nanoplastics using Focused Ultrasonic Fragmentation Method: Toward the Development of Reference Materials

Kwanyoung Ko, Tae Geol Lee, and Jaeseok Kim

(KRISS)

### TS15W\_BP\_3

#### Chemo-Biological Upcycling of Polyethylene Terephthalate Waste to Solve the Microplastic Problem

Minsik Kang<sup>1,2</sup>, Siseon Lee<sup>3</sup>, Hyunjun Ko<sup>4</sup>, Jeong Chan Joo<sup>3</sup>, and Bong Hyun Sung<sup>1,2</sup>

(<sup>1</sup>KRIBB, <sup>2</sup>UST, <sup>3</sup>Catholic University, <sup>4</sup>Kangwon National University)

### TS15W\_BP\_4

#### Thermal Annealing of Lignin: Towards Biocompatible Memory Devices

Chan Kwon, Hyun Jeong, and Mun Seok Jeong

(Hanyang University)

### TS15W\_BP\_5

#### The Potential for Capturing and Removing Microplastics and Nanoplastics using *Streptomyces* sp. 414

Jae Eun Gwak<sup>1,3</sup>, Sung Ok Han<sup>3</sup>, and Gyeongtaek Gong<sup>1,2</sup>

(<sup>1</sup>KIST, <sup>2</sup>UST, <sup>3</sup>Korea University)

### TS15W\_BP\_6

#### Ceria-Based Therapeutic Antioxidants for Preventing Radiation Proctitis

Jihwan Son, Ye Seul Oh, and Min Soh

(HyeonTechNBio, Inc.)

### TS15W\_BP\_7

#### Giant Reduction of Effective Charge for Lipid Vesicle Membrane

Jaehee Lee<sup>1</sup>, Joon Heon Kim<sup>2</sup>, Suyong Kwon<sup>3</sup>, and Myung Chul Choi<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>Advanced Photonics Research Institute, <sup>3</sup>KRISS)

### TS15W\_BP\_8

#### Piezocatalyst in Motion: Self-Inducing Flow with Piezocatalyst for Enhanced Degradation

Gunn Park, Seung-Hyun Kang, Se-Chang Oh, and Jae-Woo Park

(Hanyang University)

### TS15W\_BP\_9

#### Size- and Shape-Dependent Toxicity of Polyethylene Terephthalate Microplastics to Marine Amphipod *Monocorophium uenoi*

Jinyoung Song<sup>1</sup>, Jin Soo Choi<sup>1</sup>, Hyeonji Nam<sup>1</sup>, Asna Ali<sup>2</sup>, and June-Woo Park<sup>1,2</sup>

(<sup>1</sup>KIT, <sup>2</sup>UST)

### TS15W\_BP\_10

#### Nanotoxicity: Massive Data Extraction using ChatGPT and Development of Toxicity Prediction Models via Automated Machine Learning

Eunyoung Ha<sup>1</sup>, Hyun-Yi Kim<sup>3</sup>, Minseop Kim<sup>1</sup>, Seung-geun Park<sup>1</sup>, Seung-min Ha<sup>1</sup>, Mingyu Bae<sup>1</sup>, Minjeong You<sup>1</sup>, Soonyeop Kwon<sup>1</sup>, and Tae Hyun Yoon<sup>1,2</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>Yoon Idea Lab Co., Ltd., <sup>3</sup>NGeneS Inc.)

### TS15W\_BP\_11

#### Intergrative Transcriptomics Analysis for Evaluating Nanotoxicity Induced Adverse Outcome Pathway

Seung-geun Park<sup>1</sup>, Eunseo Lee<sup>1</sup>, Seung-Min Ha<sup>1</sup>, Yewon Han<sup>1</sup>, Bogeum Kim<sup>1</sup>, Mingyu Bae<sup>1</sup>, Soonyeop Kwon<sup>1</sup>, and Tae Hyun Yoon<sup>1,2</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>Yoon Idea Lab Co., Ltd.)

### TS15W\_BP\_12

#### Enhancing Exosome Research with AI: Development of a ChatGPT-Based Data Curator and Analysis Copilot

Minseop Kim<sup>1</sup>, Hyojin Kim<sup>1</sup>, Sunghyun Park<sup>1</sup>, Eunyoung Ha<sup>1</sup>, and Tae Hyun Yoon<sup>1,2</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>Yoon Idea Lab Co., Ltd.)

### TS15W\_BP\_13

#### Ceria-Based Therapeutic Antioxidants in Head and Neck Cancer Treatment as Radioprotectants

Jisoo Lee, Ye Seul Oh, and Min Soh

(HyeonTechNBio, Inc.)

## [TS15] Poster Session 2

Date & Time	July 4(Thu.), 2024 / 10:30-12:00
Place	Exhibition Hall 4,5

### TS15T\_P\_1

#### A 28 Days Inhalation Toxicity Testing and 7 and 28 Days Recovery Testing of Carbon Black in Sprague-Dawley Rats

Jae Hyuck Sung, Seung Han Lee, Hye-Jin Kim, Hyeon-Yeol Ryu, Mi-Jung Kim, Byunggil Choi, and Kyung-Seuk Song

(KCL)

### TS15T\_P\_2

#### Holographical Analysis of Interaction between Brain Cells and Nanoplastics using Optical Diffraction Tomography

Jiyoung Gong<sup>1,2</sup>, Bohyeon Jeong<sup>1</sup>, Da Yong Lee<sup>1,2</sup>, and Jinyoung Jeong<sup>1,2</sup>

(<sup>1</sup>KRIBB, <sup>2</sup>UST)

### TS15T\_P\_3

#### In Vitro Acute Nanoparticle Phototoxicity Assay in Skin Cell Lines

Eunha Kim<sup>1,2</sup>, Ye Ryeong Lee<sup>1,2</sup>, Nagyoung Kim<sup>1,2</sup>, Jeongbin Kim<sup>1,2</sup>, Ahruem Baek<sup>1</sup>, Tae Geol Lee<sup>1</sup>, and Min Beom Heo<sup>1</sup>

(<sup>1</sup>KRISS, <sup>2</sup>Chungnam National University)

### TS15T\_P\_4

#### Beneficial Effect of Differently-Coated Selenium Nanoparticles in 3D Cell Culture Models Mimicking the Respiratory Tract and Intestinal Epithelium

Pamina Weber<sup>1</sup>, Nikolina Kalčec<sup>2</sup>, Nikolina Peranić<sup>2</sup>, Ivana Vinković Vrček<sup>2</sup>, and Tommaso Serchi<sup>1</sup>

(<sup>1</sup>Luxembourg Institute of Science and Technology, <sup>2</sup>Institute for Medical Research and Occupational Health)

### TS15T\_P\_5

#### Measurement Procedure for Assessing Oxidative DNA Damage Caused by Nanomaterials using Enzyme-Linked Immunosorbent Assay

Geun Hoe Kim<sup>1,2</sup>, Min Beom Heo<sup>1</sup>, Tae Geol Lee<sup>1</sup>, and Jun-Hyuck Choi<sup>1,2</sup>

(<sup>1</sup>KRISS, <sup>2</sup>UST)

## [TS15] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS15F\_P\_1

#### Advancing Nanotoxicology Research through Standardized Lung Organoid Models

Hak-Sung Jung<sup>1</sup>, Min Beom Heo<sup>1</sup>, Ahruem Baek<sup>1</sup>, Hee-Kyung Na<sup>1</sup>, Tae Geol Lee<sup>1</sup>, and Hee Min Yoo<sup>1,2</sup>  
(<sup>1</sup>KRISS, <sup>2</sup>UST)

### TS15F\_P\_2

#### Improvement of Nanoparticle Research and Safety through Automated Size Measurement with Transmission Electron Microscopy: Addressing Uncertainties

Jongchul Jeon<sup>1</sup>, Sang Jung Ahn<sup>1</sup>, Jong Hyeok Seo<sup>1,2</sup>, Joohyun Lee<sup>1</sup>, Soohyeong Lee<sup>1,2</sup>, and Ji-Hwan Kwon<sup>1,2</sup>  
(<sup>1</sup>KRISS, <sup>2</sup>UST)

### TS15F\_P\_3

#### Assessing Antioxidative Responses in Egeria Densa Exposed to Titanium (IV) Dioxide Anatase Nanoparticles and Diclofenac

Youngsam Kim<sup>1,2</sup> and Young Jun Kim<sup>1,2</sup>  
(<sup>1</sup>KIST-Europe, <sup>2</sup>UST)

### TS15F\_P\_4

#### Nitric Acid and Nano-Bubbling CO<sub>2</sub> Surface Modifications of Activated Carbon Fibers for Platinum Separation

Joon Hyuk Lee, Jung-kun Song, Eunkyung Jeon, and Jaeho Choi  
(Agency for Defense Development)

### TS15F\_P\_5

#### Oxidation of Strain-Relaxed Monolayer Transition Metal Dichalcogenides on Zinc Oxide Nanorods

Jieun Jo, Ga Hyun Cho, Hyun Jeong, Hyeon Jung Park, and Mun Seok Jeong  
(Hanyang University)

### TS15F\_P\_6

#### Advanced Oxidation Processes(AOPs) using Photo-Piezoelectric Catalysts: Decomposition of Organic Pollutants using Y(IO<sub>3</sub>)<sub>3</sub>

Seung-Hyun Kang, Gunn-Park, and Jae-Woo Park  
(Hanyang University)

#### TS15F\_P\_7

##### **Quantitation of Gold Nanoparticle Uptake in Mammalian Cells via Scattering Intensity Changes Measured by Flow Cytometry**

Hye Ji Shin<sup>1,2</sup>, Minjeong Kwak<sup>1</sup>, Sook Heun Kim<sup>1</sup>, and Ji Youn Lee<sup>1,2</sup>

(<sup>1</sup>KRISS, <sup>2</sup>Chungnam National University)

#### TS15F\_P\_8

##### **Defect-Selective Chemical Reaction in WSe<sub>2</sub> through Phosphine Ligand with Large Steric Hindrance**

Taehoon Kim<sup>1</sup>, Dae Young Park<sup>1</sup>, Jungeun Song<sup>2</sup>, Hayoung Ko<sup>3</sup>, Ki Kang Kim<sup>3</sup>, Nohyeon Park<sup>4</sup>, Jooyoung Sung<sup>4</sup>, Dong-Wook Kim<sup>2</sup>, and Mun Seok Jeong<sup>1</sup>

(<sup>1</sup>Hanyang University, <sup>2</sup>Ewha Womans University, <sup>3</sup>Sungkyunkwan University, <sup>4</sup>DGIST)

#### TS15F\_P\_9

##### **Development of Evaluation Method for Ligand Conjugation and Free Ligands of Nanoparticles using Mass Images and Statistical Analysis**

Hyun Kyong Shon, Tae Geol Lee, and Jin Gyeong Son

(KRISS)

#### TS15F\_P\_10

##### **The Comparative Inflammation Potential of Polypropylene and Polyethylene Microplastics in Mice**

Eunsol Bae and Wan-Seob Cho

(Dong-A University)

#### TS15F\_P\_11

##### **Quantification of Nanoparticles using Electrospray SMPS Technique**

Jaeseok Kim, Minjeong Kwak, and Tae Geol Lee

(KRISS)

#### TS15F\_P\_12

##### **Copper Iodide Thin Film as a Transparent Conductors**

Sungsan Kang and Sangyeon Pak

(Hongik University)

#### TS15F\_P\_13

##### **2D MoS<sub>2</sub> Field Effect Transistor with Asymmetric Contact**

Jinhyeok Pyo and Sangyeon Pak

(Hongik University)

### TS15F\_P\_14

#### **Development of Bronchoalveolar Lavage Fluid Analysis Method for the Inhalation Toxicity Studies of Nanoparticles**

Soyeon Jeon<sup>1</sup>, Kyung Seuk Song<sup>2</sup>, Jae Hyuck Sung<sup>2</sup>, and Wan-Seob Cho<sup>1</sup>

*(<sup>1</sup>Dong-A University, <sup>2</sup>Korea Conformity Laboratories)*

### TS15F\_P\_15

#### **Evaluating Cell Growth and Hypoxic Regions of 3D Spheroids via a Machine Learning Approach**

Jaekak Yoo<sup>1,2</sup>, Jae-Won Choi<sup>1,3</sup>, Eunha Kim<sup>1,4</sup>, Eun-Jung Park<sup>3</sup>, Ahruem Baek<sup>1</sup>, Jaeseok Kim<sup>1</sup>, Nagyoung Kim<sup>1,4</sup>, Jeongbin Kim<sup>1,4</sup>, Tae Geol Lee<sup>1</sup>, and Min Beom Heo<sup>1</sup>

*(<sup>1</sup>KRISS, <sup>2</sup>Sungkyunkwan University, <sup>3</sup>Kyung Hee University, <sup>4</sup>Chungnam National University)*

# Technical Sessions

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## [TS16] Computational Materials and Data Science for Nanotechnology

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### **Theme: Advanced Applications of Computational Modeling and AI for the Materials/Process Design in Nanomaterials**

Computational materials science and data-driven insights occupy pivotal positions in our quest to understand and engineer cutting-edge functional nanomaterials. The primary objective of this session is to disseminate the latest breakthroughs in the realms of computational materials science, materials databases, and artificial intelligence (AI), catering to a diverse audience of researchers, spanning not only this field but also its interdisciplinary applications. Among the topics of focus are the next generation of electronic/photonic nanomaterials, nanomaterials for renewable energy and energy storage, computational techniques for material design and characterization, and the advancement of state-of-the-art computational methodologies.

## [TS16W1]

### Computational Materials and Data Science for Nanotechnology 1

Date & Time	July 3(Wed.), 2024 / 09:00–10:30
Place	Room 213
Session Chair(s)	Ki-Ha Hong (Hanbat Nat'l Univ.)

#### TS16W1\_O\_1

09:00–09:20

##### Small Dataset Machine-Learning Approaches to Explore the Design Space of Multicomponent Alloys

Seung-Hyun Victor Oh<sup>1</sup>, Su-Hyun Yoo<sup>2</sup>, and Woosun Jang<sup>1</sup>

(<sup>1</sup>Yonsei University, <sup>2</sup>KRICT)

#### TS16W1\_O\_2

09:20–09:40

##### Understanding Off-Stoichiometry of Q-Phase in Al-Cu-Mg-Si Alloys

Kyoungdoc Kim

(POSTECH)

#### TS16W1\_O\_3

09:40–10:00

##### Exploration of High-Ductility Ternary Refractory High-Entropy Alloys using First-Principles Calculations and Machine Learning

Hyo-Sun Jang<sup>1</sup>, Jin-Woong Lee<sup>2,3</sup>, Byung Do Lee<sup>2</sup>, Kee-Sun Sohn<sup>2</sup>, Jiwon Park<sup>1</sup>, and Chang-Seok Oh<sup>1</sup>

(<sup>1</sup>KIMS, <sup>2</sup>Sejong University, <sup>3</sup>SK Siltron Inc.)

#### TS16W1\_O\_4

10:00–10:15

##### Understanding and Control of Nano-Scale Grain Evolution in Nb<sub>3</sub>Sn Superconducting Wire

Sang-Ho Oh<sup>1</sup>, Yang-Jin Jeong<sup>2</sup>, Sin-Hye Na<sup>2</sup>, Jiman Kim<sup>2</sup>, and Byeong-Joo Lee<sup>1</sup>

(<sup>1</sup>POSTECH, <sup>2</sup>Kiswire Advanced Technology Ltd.)

#### TS16W1\_O\_5

10:15–10:30

##### Machine Learning-Driven Solutions to Evaporation-Induced Variability in Chemical Composition of In-Situ Alloyed Products Fabricated by Direct Energy Deposition

Jaemin Wang, Eun Seong Kim, Hyoung Seop Kim, and Byeong-Joo Lee

(POSTECH)



**[TS16W2]****Computational Materials and Data Science for Nanotechnology 2**

<b>Date &amp; Time</b>	July 3(Wed.), 2024 / 15:40–18:00
<b>Place</b>	Room 213
<b>Session Chair(s)</b>	Ji Woong Yu (KIAS)

**TS16W2\_I\_1 \*Invited 15:40–16:10****Molecular Dynamics Study on (Poly)electrolytes**

Chanui Park, Seulwoo Kim, Junbeom Cho, Minhwan Lee, Sebin Kim, Sang Deok Kim, and Won Bo Lee  
(Seoul National University)

**TS16W2\_O\_2 16:10–16:30****Understanding Novel Nano Structures and Anomalous Dynamics Induced by Strong Confinement and Surface Polarization with Molecular Simulations**

Chang Yun Son  
(POSTECH)

**TS16W2\_O\_3 16:30–16:45****Designing Fluorinated Polymers with High Glass Transition Temperature using Machine Learning Models**

Jin-Hoon Yang, Jiyoung Lee, Hajin Kwon, Eun-Ho Sohn, Hyunju Chang, and Seunghun Jang  
(KRICT)

**TS16W2\_O\_4 16:45–17:00****Efficient and Transferable Many-Body Noncovalent Interaction Model for Water: The SAPT-MLW**

Kyeong-Jun Jeong and Chang Yun Son  
(POSTECH)

**TS16W2\_O\_5 17:00–17:15****Understanding Lower Dielectric Constant and Anomalous Dynamics in Nanoconfined Water**

Chaemin Jeong and Chang Yun Son  
(POSTECH)

**TS16W2\_O\_6 17:15–17:30****Computational Study of Lithium Ion-Transport in Covalent Organic Frameworks**

Akshay Gurumoorthi and Chang Yun Son  
(POSTECH)

TS16W2\_O\_7

17:30-17:45

**Two Fates of Peptide Isomerization Kinetics Near Aqueous Interfaces**

Sangmin Lee and Chang Yun Son

*(POSTECH)*

TS16W2\_O\_8

17:45-18:00

**First Principle Force Field for the Lithium Ion Battery Electrolytes**

Seungwon Jeong and Chang Yun Son

*(POSTECH)*

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**[TS16T3]****Computational Materials and Data Science for Nanotechnology 3**

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 09:00–10:35
<b>Place</b>	Room 213
<b>Session Chair(s)</b>	Dong-Hwa Seo (KAIST)

**TS16T3\_I\_1 \*Invited 09:00–09:30****Predicting Polaron Stabilities and Barriers in Battery Materials**

Harald Oberhofer

*(University of Bayreuth)***TS16T3\_O\_2 09:30–09:50****Highly Reliable and Large-Scale Simulations of Argyrodite Solid-State Electrolytes using a Machine-Learned Moment Tensor Potential**

Ji Hoon Kim, Ji Seon Kim, and Sang Uck Lee

*(Sungkyunkwan University)***TS16T3\_O\_3 09:50–10:05****Revealing Interfacial Superionic Conduction Mechanisms of New Halide Nanocomposite Solid Electrolytes for All-Solid-State Batteries**Jae-Seung Kim<sup>1</sup>, Hiram Kwak<sup>2</sup>, Daseul Han<sup>3</sup>, Kyung-Wan Nam<sup>3</sup>, Yoon Seok Jung<sup>2</sup>, and Dong-Hwa Seo<sup>1</sup>*(<sup>1</sup>KAIST, <sup>2</sup>Yonsei University, <sup>3</sup>Dongguk University)***TS16T3\_O\_4 10:05–10:20****Phase-Field Modelling of Electrodeposition in Aqueous Zn Ion Batteries**

Mohan Dasari, Arijit Roy, John Hong, and Pil-Ryung Cha

*(Kookmin University)***TS16T3\_O\_5 10:20–10:35****Prediction of Degradation in Li-Metal Anodes over Charging/Discharging Cycles**

Hyunjoo Lee and Dongchoul Kim

*(Sogang University)*

### [TS16T4]

#### Computational Materials and Data Science for Nanotechnology 4

Date & Time	July 4(Thu.), 2024 / 14:00–15:35
Place	Room 213
Session Chair(s)	Hyungjun Kim (KAIST)

**TS16T4\_I\_1 \*Invited** 14:00–14:30

**Ab Initio Quantum Dynamics of Electronic Excitations in Quantum Dots: Semiconducting, Metallic and Perovskites**

Oleg Prezhdo

*(University of Southern California)*

**TS16T4\_I\_2 \*Invited** 14:30–15:00

**Towards Defect Engineering in Memristors based on Low-Dimensional Materials**

Roohbeh Anvari, Brian H. Lee, and Wennie Wang

*(The University of Texas at Austin)*

**TS16T4\_O\_3** 15:00–15:20

**Overcoming the Traditional N-type Doping Limit of Si through Chalcogen Doping**

Youngho Kang

*(Incheon National University)*

**TS16T4\_O\_4** 15:20–15:35

**A Realistic Deep Learning Model for Dielectric Nanomaterials**

Sejun Kim and Hyungjun Kim

*(KAIST)*

**[TS16T5]****Computational Materials and Data Science for Nanotechnology 5**

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 15:40–18:05
<b>Place</b>	Room 213
<b>Session Chair(s)</b>	Hyun You Kim (Chungnam Nat'l Univ.)

**TS16T5\_I\_1 \*Invited 15:40–16:10****Computational Catalysts Design for the Sustainable Hydrogen Future**Xiangfu Niu<sup>1</sup>, Shuwei Li<sup>1</sup>, and Liang Zhang<sup>1,2</sup>*(<sup>1</sup>Tsinghua University, <sup>2</sup>Beijing Huairou Laboratory)***TS16T5\_O\_2 16:10–16:30****Simulation of Catalyst Degradation using Machine-Learned Potentials**Sungwoo Kang<sup>1</sup>, Jisu Jung<sup>2</sup>, Suyeon Ju<sup>2</sup>, Purun-hanul Kim<sup>2</sup>, Deokgi Hong<sup>2</sup>, Wonseok Jeong<sup>3</sup>, and Seungwu Han<sup>2</sup>*(<sup>1</sup>KIST, <sup>2</sup>Seoul National University, <sup>3</sup>Lawrence Livermore National Laboratory)***TS16T5\_O\_3 16:30–16:50****Constructing a Knowledge-Centric Vector Database for Materials Science: Bridging Data, Information, and Insights**

Jungho Shin

*(KRICT)***TS16T5\_O\_4 16:50–17:05****Unlocking Design Strategies for Oxygen Evolution Reaction Catalysts: Insights from Kinetic Perspective via Constrained Ab Initio Molecular Dynamics Simulations**

Dongyup Shin and Sang Soo Han

*(KIST)***TS16T5\_O\_5 17:05–17:20****Design Strategies of Bimetallic Catalysts for Electroreduction of Toluene into Methylcyclohexane**

Chen-Hui Chan and Sang Soo Han

*(KIST)***TS16T5\_O\_6 17:20–17:35****Studying Facet-Selective Adsorption of CO on Cu using the Random Phase Approximation**

Seungchang Han and Stefan Ringe

*(Korea University)*

TS16T5\_O\_7

17:35–17:50

**Rational Design of Graphene-Supported Single-Atom Catalysts via Formulating Electronic Descriptors for Oxygen Electrocatalysis**

Jungwoo Choi<sup>1,2</sup>, Doosun Hong<sup>2</sup>, and Hyuck Mo Lee<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>KIST)

TS16T5\_O\_8

17:50–18:05

**DFT Investigation of CO<sub>2</sub> Hydrogenation on Pd-Based Catalysts: Exploring the Impact of C–O Bond Activation**

Yejung Choi, Hyuk Choi, Ju Hyeok Lee, Jongseok Kim, and Hyun You Kim

(*Chungnam National University*)

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**[TS16F6]****Computational Materials and Data Science for Nanotechnology 6**

<b>Date &amp; Time</b>	July 5(Fri.), 2024 / 09:00–10:15
<b>Place</b>	Room 213
<b>Session Chair(s)</b>	Yongwoo Kwon (Hongik Univ.)

<b>TS16F6_I_1</b>	<b>*Invited</b>	<b>09:00–09:30</b>
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**Optimizing MXenes for the Future: Single Atom Catalyst, Electronic Transport and Spintronic Applications**

Seung-Cheol Lee  
(KIST)

<b>TS16F6_O_2</b>	<b>09:30–09:45</b>
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**A Phase-Field Model Coupled with Genetic Algorithm: Application to Ferroelectric Switching in Nanograins of HZO Thin Film**

Sandeep Sugathan<sup>1</sup>, Krishnamohan Thekkepat<sup>2</sup>, Jiyoung Kim<sup>3</sup>, and Pil-Ryung Cha<sup>1</sup>  
(<sup>1</sup>Kookmin University, <sup>2</sup>KIST, <sup>3</sup>The University of Texas at Dallas)

<b>TS16F6_O_3</b>	<b>09:45–10:00</b>
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**Phase-Field Study on Grain Refinement of Al-Si Alloys**

Dong-Uk Kim and Pil-Ryung Cha  
(Kookmin University)

<b>TS16F6_O_4</b>	<b>10:00–10:15</b>
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**Study on Multifunctional Metal Oxide Nanocomposite Bandage for Application in Bone Regeneration**

Pritam Das<sup>1</sup>, Yu-Chan Kim<sup>2</sup>, and Pil-Ryung Cha<sup>1</sup>  
(<sup>1</sup>Kookmin University, <sup>2</sup>KIST)

## [TS16F7]

### Computational Materials and Data Science for Nanotechnology 7

Date & Time	July 5(Fri.), 2024 / 14:00–15:40
Place	Room 213
Session Chair(s)	Minkyu Park (Virtual Lab Inc.)

#### TS16F7\_O\_1

14:00–14:20

##### Data/AI-Enabled Acceleration of Catalyst Development

Donghun Kim

(KIST)

#### TS16F7\_O\_2

14:20–14:40

##### Data-Driven Anomaly Classification of Molecule-Adsorbed Catalyst Surfaces

Juhwan Noh and Hyunju Chang

(KRICT)

#### TS16F7\_O\_3

14:40–14:55

##### Introduction to SevenNet

Seungwoo Hwang, Yutack Park, Jaesun Kim, and Seungwu Han

(Seoul National University)

#### TS16F7\_O\_4

14:55–15:10

##### Inverse Design for Materials Discovery from the Multidimensional Electronic Density of States

Doosun Hong<sup>1</sup>, Kihoon Bang<sup>1</sup>, Jeongrae Kim<sup>1,2</sup>, Donghun Kim<sup>1</sup>, and Sang Soo Han<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea Polytechnics)

#### TS16F7\_O\_5

15:10–15:25

##### A Combined First-Principles and Machine Learning Exploration of Alloying the Lithium Metal Anode for Enhanced Li-S Battery Performance

Il Seok Jeong, Seung Zeon Han, and Eun Ae Choi

(KIMS)

#### TS16F7\_O\_6

15:25–15:40

##### Unveiling 3D Structural Information via Deep Learning of 4D-STEM

Jinho Byun<sup>1</sup>, Keeyong Lee<sup>1</sup>, Daesung Park<sup>2</sup>, Hyobin Yoo<sup>2</sup>, Geun Ho Gu<sup>1</sup>, and Sang Ho Oh<sup>1</sup>

(<sup>1</sup>KENTECH, <sup>2</sup>Sogang University)



# [TS16] Poster Session 1

## Best Poster Awards Candidates

Date & Time	July 3(Wed.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS16W\_BP\_1

#### Characterizing Preferential Storage of Medicinal Biomaterials with Transfer Free Energy Calculations

Minhye Kim and Chang Yun Son

(POSTECH)

### TS16W\_BP\_2

#### Solidification Simulation of Giga Casting Alloys: Controlling Al-Fe-Mn Beta Phase Formation with Phase-Field Simulation Study

Hyung-Uk Jang, Hwi-Jae Cho, Dong-Uk Kim, and Pil-Ryung Cha

(Kookmin University)

### TS16W\_BP\_3

#### Compound Layer Growth Kinetics during Nitrocarburizing Process: A Phase Field Study

Yelim Kim, Arigit Roy, and Pilryung Cha

(Kookmin University)

### TS16W\_BP\_4

#### Phase-Field Study of Solid-State Sintering with Multiphase Nano-Powders in Fe-Ni Alloys

K. Kim, S. Sugathan, A. Roy, and P-R. Cha

(Kookmin University)

### TS16W\_BP\_5

#### Symmetry-Broken Manganese Oxide Nanocatalyst for Water Oxidation

Sunghak Park<sup>1</sup>, Taehwan Jang<sup>2</sup>, Seungwoo Choi<sup>1</sup>, Yoon Ho Lee<sup>1</sup>, Kang Hee Cho<sup>1</sup>, Moo Young Lee<sup>1</sup>, Hongmin Seo<sup>1</sup>, Hyung Kyu Lim<sup>3</sup>, Yujeong Kim<sup>4</sup>, Jinseok Ryu<sup>1</sup>, Sang Won Im<sup>1</sup>, Min Gyu Kim<sup>5</sup>, Ji-Sang Park<sup>6</sup>, Miyoung Kim<sup>1</sup>, Kyoungsuk Jin<sup>1,7</sup>, Sun Hee Kim<sup>4</sup>, Gyeong-Su Park<sup>1,8</sup>, Hyungjun Kim<sup>2</sup>, and Ki Tae Nam<sup>1</sup>

(<sup>1</sup>Seoul National University, <sup>2</sup>KAIST, <sup>3</sup>Kangwon National University, <sup>4</sup>KBSI, <sup>5</sup>POSTECH, <sup>6</sup>Sungkyunkwan University, <sup>7</sup>Korea University, <sup>8</sup>DGIST)

### TS16W\_BP\_6

#### Phase Field Modeling of Strain Influenced Phase Transformations in MoTe<sub>2</sub>

Muhammad Hassaan Ali, Won-Kyu Lee, and Yongwoo Kwon

(Hongik University)

### TS16W\_BP\_7

#### **Nano Surface Control through Precision Analysis and Automating Defect Prediction Digital Transformation System**

Eun Kyoung Lee, Byeong Tae Im, and Ji Eun Kim

*(LG Innotek)*

### TS16W\_BP\_8

#### **Effects of Energetic Disorder in Doped Conducting Polymer: Molecular Dynamics and Monte Carlo Study**

Seonghyeon Kang, Seungwon Jeong, and Chang Yun Son

*(POSTECH)*

### TS16W\_BP\_9

#### **Machine-Learning Potential Based Molecular Dynamics Studies on Amorphous Solid-State Electrolytes**

Beomgyu Kang and Bong June Sung

*(Sogang University)*

### TS16W\_BP\_10

#### **Conformation and Adsorption Energy of Single-Chain Polymer over Metal and Metal Oxide**

SeungBin Hong, DongUk Shin, and ChangYun Son

*(POSTECH)*

### TS16W\_BP\_11

#### **First-Principles Study of the Copper Oxides under Reducing Conditions**

Hoseong Seol and Stefan Ringe

*(Korea University)*

### TS16W\_BP\_12

#### **Functional Group-Dependent Proton Conductivity of Phosphoric Acid-Doped Ion-Pair Coordinated Polymer Electrolytes: A Molecular Dynamics Study**

Hyeonju Lee<sup>1,2</sup>, William A. Goddard III<sup>2</sup>, JinHyeok Cha<sup>3</sup>, Won Jae Choi<sup>3</sup>, Seung Hyo Noh<sup>3</sup>, Hyeyoung Shin<sup>4</sup>, and Hyungjun Kim<sup>1,2</sup>

*(<sup>1</sup>KAIST, <sup>2</sup>California Institute of Technology, <sup>3</sup>Hyundai Motor Company, <sup>4</sup>Chungnam National University)*

### TS16W\_BP\_13

#### **Quality Analysis of Commercial Wine using Raman Spectroscopy and Artificial Intelligence Algorithm**

Onyu Kim<sup>1</sup> and Dong-Kwon Lim<sup>1,2</sup>

*(<sup>1</sup>Korea University, <sup>2</sup>KIST)*

#### TS16W\_BP\_14

##### **Ab Initio Study on Improving Electrochemical Performance of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ Spinel Cathode for Lithium-Ion Batteries**

Phan Thi Yen Nhi, Truong Ba Tai, and Hyeyoung Shin

*(Chungnam National University)*

#### TS16W\_BP\_15

##### **Toward Feasible Single Atom-Based Hydrogen Evolution Electrocatalysts via Artificial Ensemble Sites for Anion Exchange Membrane Water Electrolyzer**

Hoang Nam Truong<sup>1</sup>, Won-Gwang Lim<sup>2</sup>, Jae-Yeop Jeong<sup>3</sup>, Seonggyu Lee<sup>4</sup>, Eunho Lim<sup>5</sup>, and Hyeyoung Shin<sup>1</sup>

*(<sup>1</sup>Chungnam National University, <sup>2</sup>KAIST, <sup>3</sup>KIMS, <sup>4</sup>Kumoh National Institute of Technology, <sup>5</sup>KRICT)*

#### TS16W\_BP\_16

##### **Computational Design of Transition Metals-Doped NiFe Layered Double Hydroxides for Oxygen Evolution Reaction**

Phuong Minh Nguyen and Hyeyoung Shin

*(Chungnam National University)*

#### TS16W\_BP\_17

##### **Understanding the Electrode-Electrolyte Interfaces for Enhancing Lithium-Ion Battery Performance**

Vy Nguyen Thuy and Hyeyoung Shin

*(Chungnam National University)*

#### TS16W\_BP\_18

##### **Two-Level Simulation Study of Memristive Device Interfacial Switching by Modulating the Schottky Barrier Height**

Sagar Khot, Dongmyung Jung, and Yongwoo Kwon

*(Hongik University)*

#### TS16W\_BP\_19

##### **Revealing the Electric Double Layer Structure with Constant Bulk Electrolyte Concentration Simulation**

Minho M. Kim, Seung-Jae Shin, and Hyungjun Kim

*(KAIST)*

#### TS16W\_BP\_20

##### **Coupling Phase Field and Viscoplasticity to Study Rafting in Ni-Based Super Alloys using Infinitesimal Strain Approximation**

Tariq Ali, Soumya Bandyopadhyay, and Pil-Ryung Cha

*(Kookmin University)*

## [TS16] Poster Session 2 Best Poster Awards Candidates

Date & Time	July 4(Thu.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS16T\_BP\_1

#### Regulating Li ion Migration Pathway through Structural Distortion in Monoclinic Halide Solid Electrolytes

Seung-Hui Ham and Dong-Hwa Seo  
(KAIST)

### TS16T\_BP\_2

#### First-Principles Study Exploring the Influence of Structural Vibrational Entropy on Thermally Regenerative Electrochemical Systems

You-Yeob Song<sup>1</sup>, Ahreum Choi<sup>2</sup>, Seok Woo Lee<sup>3</sup>, Hyun-Wook Lee<sup>2</sup>, and Dong-Hwa Seo<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>UNIST, <sup>3</sup>Nanyang Technological University)

### TS16T\_BP\_3

#### Artificial Intelligence-Based Modeling for Predicting Precipitates in Aluminum Alloys

AhYeon Cho<sup>1</sup>, HyunJoo Choi<sup>1</sup>, and YongJoo Kim<sup>2</sup>  
(<sup>1</sup>Kookmin University, <sup>2</sup>Korea University)

### TS16T\_BP\_4

#### First-Principles Calculation Study on Lithium-Ion Conduction Mechanisms in Halide Solid Electrolytes

Chang-Dae Lee and Dong-Hwa Seo  
(KAIST)

### TS16T\_BP\_5

#### Dispersant Effect in Cathode Material Slurry System

Minyoung Seo<sup>1</sup>, Anseong Park<sup>2</sup>, Je-Yeon Jung<sup>2</sup>, Seungtae Kim<sup>2</sup>, WooJin Kim<sup>2</sup>, Sangdeok Kim<sup>2</sup>, YongJoo Kim<sup>1</sup>, and Won Bo Lee<sup>2</sup>  
(<sup>1</sup>Kookmin University, <sup>2</sup>Seoul National University)

### TS16T\_BP\_6

#### Molecular Dynamics Simulation Study on the Additive Manufacturing Process of NiAl Shape-Memory Alloys

Jong-Hoon Park and Won-Seok Ko  
(Inha University)

**TS16T\_BP\_7**

**Effect of Solute Elements on the Performance of  $\text{Mg}_2\text{Ni}$ -Based Hydrogen Storage Alloys: A First-Principles Study**

Min-Seok Yoon and Won-Seok Ko  
(Inha University)

**TS16T\_BP\_8**

**Deformation Behavior of Nanotwin Structured Metals with Molecular Dynamics Simulation**

Jea-Young Hwang and Won-Seok Ko  
(Inha University)

**TS16T\_BP\_9**

**Demonstration of  $\text{ZnO}$ -Te Anti-Ambipolar Switch Compatible with BEOL for Energy-Efficient System**

Jae Hyeon Jun, Minjae Kim, Hae-Won Lee, Chan Bin Lee, Kyuheon Kim, and Byoung Hun Lee  
(POSTECH)

**TS16T\_BP\_10**

**Leveraging Large Language Models for Parameter Findings in Device Simulation of Perovskite Solar Cells**

Eun Ha Shin, Sang Woo Park, Jong Su Chae, and Ki-Ha Hong  
(Hanbat National University)

**TS16T\_BP\_11**

**Study on the Performance Enhancement Mechanism of Ultrathin  $\text{HfO}_2$  and  $\text{ZrO}_2$  Superlattice Structure**

Woo Won Jeong and Ki-Ha Hong  
(Hanbat National University)

**TS16T\_BP\_12**

**Dopant Selection for Enhanced Structural Stability in  $\text{CsPbI}_3$  Perovskite Materials: A Computational Investigation**

Atefeh Yadegarifard, Jung Hoon Lee, and Byungju Lee  
(KIST)

**TS16T\_BP\_13**

**Phase-Field Simulation of Thin Film Deposition and Crystallization**

Hwanwook Lee and Yongwoo Kwon  
(Hongik University)

**TS16T\_BP\_14**

**Full Quantum Electron Transfer Theory**

Yoosang Son<sup>1</sup>, Oleg V. Prezhdo<sup>2</sup>, and Hyungjun Kim<sup>1</sup>  
(<sup>1</sup>KAIST, <sup>2</sup>University of Southern California)

## [TS16] Poster Session 3

Date & Time	July 5(Fri.), 2024 / 10:30–12:00
Place	Exhibition Hall 4,5

### TS16F\_P\_1

#### Understanding Ambivalent Role of the Mn Content in Mn-Based Cationdisordered Rock-Salts for Next-Generation Lithium-Ion Batteries

Dae-Hyung Lee<sup>1,2</sup>, Eunryeol Lee<sup>1</sup>, Stéphanie Bessette<sup>3</sup>, Sang-Wook Park<sup>1,2</sup>, Nicolas Brodusch<sup>3</sup>, Gregory Lazaris<sup>3</sup>, Hojoon Kim<sup>1,2</sup>, Rahul Malik<sup>4</sup>, Raynald Gauvin<sup>3</sup>, Jinhyuk Lee<sup>3</sup>, and Dong-Hwa Seo<sup>1,2</sup>

(<sup>1</sup>UNIST, <sup>2</sup>KAIST, <sup>3</sup>McGill University, <sup>4</sup>Natural Resources Canada)

### TS16F\_P\_2

#### Synergistic Interactions in Metal-Oxide Electrocatalysts for Water Electrolysis: Computational Insights

Byung-Hyun Kim

(Hanyang University)

### TS16F\_P\_3

#### First-Principles Computational Study on Li<sub>x</sub>C<sub>60</sub> Nanoparticle: Highperformance Anode Material for Li-Ion Batteries

Dong-Hwa Seo<sup>1</sup>, Dae-Hyung Lee<sup>1</sup>, Linghong Yin<sup>2</sup>, Jiung Cho<sup>3</sup>, Su Jae Kim<sup>2</sup>, Il Jeon<sup>2</sup>, Mihee Park<sup>2</sup>, Minjoon Park<sup>2</sup>, and Chae-Ryong Cho<sup>2</sup>

(<sup>1</sup>KAIST, <sup>2</sup>Pusan National University, <sup>3</sup>KBSI)

### TS16F\_P\_4

#### Screening of Fluorinated Electrolytes for High-Voltage Lithium-Ion Batteries

Jaekyeong Han and Dong-Hwa Seo

(KAIST)

### TS16F\_P\_5

#### Modeling of Series of Switching Operation in Resistive Memory using Fully-Coupled Phase-Field and Thermo-Electric Equations

Dongmyung Jung and Yongwoo Kwon

(Hongik University)

**TS16F\_P\_6**

**Nanocomposite Engineering of Heterogeneous Mn-Based Cation-Disordered Cathodes for Low-Cost Lithium-Ion Batteries**

Eunryeol Lee<sup>1</sup>, Tae-Ung Wi<sup>1</sup>, Jaehyun Park<sup>1</sup>, Sang-Wook Park<sup>1</sup>, Dae Hyung Lee<sup>1</sup>, Min-Ho Kim<sup>1</sup>, Byung-Chun Park<sup>2</sup>, Chiho Jo<sup>2</sup>, Rahul Malik<sup>3</sup>, Tae Joo Shin<sup>1</sup>, Seok Ju Kang<sup>1</sup>, Hyun-Wook Lee<sup>1</sup>, Jinhyuk Lee<sup>4</sup>, and Dong-Hwa Seo<sup>1,5</sup>

(<sup>1</sup>UNIST, <sup>2</sup>LG Energy Solution, <sup>3</sup>Natural Resources Canada, <sup>4</sup>McGill University, <sup>5</sup>KAIST)

**TS16F\_P\_7**

**Accelerated Design of Lead-Free Halide Perovskites with Multiple Machine Learning**

Sang Woo Park and Ki-Ha Hong

(Hanbat National University)

**TS16F\_P\_8**

**Simulation of General Shape Precipitate using Phase-Field Model Incorporating Interfacial Energy Anisotropy**

Hwijae Cho, Hyung-Uk Jang, Dong-Uk Kim, and Pil-Ryung Cha

(Kookmin University)

**TS16F\_P\_9**

**Molecular Dynamics Simulation Approach to the Material Utilization of Gquadruplex as a Nanobiosensor**

Juhwa Lee, Hyebin Yoo, Seung Soo Oh, and Chang Yun Son

(POSTECH)

**TS16F\_P\_10**

**The Importance of Metal-Oxyl Character on Oxygen Evolution Reaction Catalyzed by Mn<sub>3</sub>O<sub>4</sub>**

Jaewoo Jeong<sup>1</sup>, Hyeyoung Shin<sup>2</sup>, and Hyungjun Kim<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>Chungnam National University)

**TS16F\_P\_11**

**Elucidating Diffusion Properties of Amorphous LPS Solid Electrolytes**

Chihun Kim<sup>1,2</sup>, Yong-Mook Kang<sup>2</sup>, and Byungju Lee<sup>1</sup>

(<sup>1</sup>KIST, <sup>2</sup>Korea University)

**TS16F\_P\_12**

**Optimizing CO<sub>2</sub> Diffusion in Diamine-Functionalized Metal-Organic Frameworks: Accurate and Efficient Molecular Dynamics Simulations with Machine-Learning Potentials**

Joharimanitra Randrianandraina and Jung-Hoon Lee

(KIST)

**TS16F\_P\_13**

**Computational Investigation of the Hydrogen Storage Performance of Ni-Based Metal-Organic Frameworks**

Dong Yun Shin and Jung-Hoon Lee

(KIST)

**TS16F\_P\_14**

**Predicting the Structure of Copper Oxides under Reducing Conditions using Moment Tensor Potentials**

Chanjin Kim, Hafiz Ghulam Abbas, and Stefan Ringe

*(Korea University)*

**TS16F\_P\_15**

**Elucidating Interface Reaction of Argyrodite/Li Metal as Solid-State Electrolyte/Anode Composition using Moment Tensor Potentials**

Ji Seon Kim and Sang Uck Lee

*(Sungkyunkwan University)*

**TS16F\_P\_16**

**Bioinspired Fe and Ni Bimetallic Active Species Coordinated to Carbon Nitride Networks and their Electrocatalytic Properties for O<sub>2</sub> Evolution**

Seong Chan Cho, Jae Hun Seol, and Sang Uck Lee

*(Sungkyunkwan University)*

NANO  
KOREA  
2024  
Symposium



**NANO KOREA 2024**  
**Symposium**

# **ACS Nano Summit 2024**



## ► ACS Nano Summit 2024: Emerging Materials for Future Nanotechnology

**Date/Time** : July 4(Thu.), 2024 / 09:00–18:00

**Venue** : Room 210, KINTEX I, Korea

**Theme** : ACS Editors Keynote and Invited Talks, ACS Lectureship and Impact Awards Lecture

**Introduction** : Welcome to the ACS Nano Summit 2024: Emerging Materials for Future Nanotechnology. In this session, we will provide an unparalleled opportunity for global colleagues to reconnect and engage in discussions on the latest scientific breakthroughs, technological advancements, and emerging trends in the field. The distinguished conference will include keynote presentations by ACS Nano editors, who will lead themed sessions and encourage stimulating discussions on the growing challenges in the field. Featuring ACS Editors Keynote and Invited Talks, as well as ACS Lectureship and Impact Awards Lecture, this session promises insightful discussions and innovative perspectives on the evolving world of nanomaterials. Join us as we unravel the potential of emerging materials in driving advancements and revolutionizing nanotechnology as we know it.

**Hosted/Organized by** : ACS Publications

### Program

Time	Speaker	Abstract title
<b>Session I: Nano-Biotechnology (Chair: Il-Doo Kim)</b>		
09:00~09:05	Organizing Committee Chair, <b>Jinho Ahn</b> (Hanyang Univ.)	Opening remark
09:05~09:25	ACS Nano, Topic Editor, <b>Silvia Marchesan</b> (Univ. of Trieste)	Chirality as a stargate for peptide self-assembly into functional nanostructures
09:25~09:45	ACS Nano, Executive Editor, <b>Chunying Chen</b> (NCNST)	Exploring the Biological Behavior and Fate of Nanomedicines by Advanced Light Source Analytical Techniques
09:45~10:05	ACS Nano, Executive Editor, <b>Luis M. Liz-Marzán</b> (CIC biomaGUNE)	Surfactants as Shape-Directing Agents for Metal Nanocrystal Growth
10:05~10:25	ACS Nano, Associate Editor, <b>Tony Hu</b> (Tulane Univ.)	Detecting the undetectable with AI-enabled nanotechnology
10:25~10:45	ACS Nano, Associate Editor, <b>Wolfgang Parak</b> (Univ. of Hamburg)	Quantitative Interaction of colloids with cells
10:45~11:15	Top-tier ACS Contributor, <b>Taeghwan Hyeon</b> (SNU)	Designed Synthesis and Assembly of Inorganic Nanomaterials for Energy and Catalytic Applications
11:15~12:00	Poster Session & ACS Networking time	
12:00~13:00	Lunch Break	
13:00~14:00	ACS Nano, Editor-in-Chief, <b>Xiaodong Chen</b> (NTU)	Conformal Nano-bio Interfaces for Sense Digitalization
<b>Session II: Nanoelectronics, Energy &amp; Catalyst (Chair: Luis M. Liz-Marzan)</b>		
14:00~14:20	ACS Nano, Associate Editor, <b>Anita Ho-Baillie</b> (Univ. of Sydney)	2D Perovskite Optoelectronic and Solar Cell Research at the University of Sydney
14:20~14:40	ACS Appl. Nano Mater, Deputy Editor, <b>T. Randall Lee</b> (Univ. of Houston)	Photonic Nanoparticles for Hydrogen Production and Biosensing
14:40~15:00	ACS Nano, Associate Editor, <b>Yan Li</b> (Peking Univ.)	Single-Walled Carbon Nanotubes Acting as Electronic Materials
15:00~15:20	ACS Nano, Associate Editor, <b>Jinhua Ye</b> (Hebei Univ.)	Solar-to-Fuel Conversion: from Photocatalysis to Photothermal Catalysis
15:20~15:40	ACS Nano, Associate Editor, <b>Mathieu Salanne</b> (Sorbonne Univ.)	Understanding the electric double-layer from molecular dynamics
15:40~16:00	Coffee Break	
16:00~16:30	<b>Burak Guzelturk</b> (Argonne Nat'l Lab.) (Moderator: Xiaodong Chen)	Light-induced Structural Control in Nanocrystals
16:30~17:00	<b>Hui Ying Yang</b> (SUTD) (Moderator: Young Hee Lee)	High Performance Potassium Ion Batteries based on Hollow Ternary (Bi-Sb) <sub>2</sub> S <sub>3</sub> @N-C Nanocube
17:00~17:30	<b>Junsuk Rho</b> (POSTECH) (Moderator: Chunying Chen)	Metaphotonics for future optical components and devices: Design, materials and manufacturing
17:30~18:00	Poster Awards, ACS Top Contributors (Moderator: Il-Doo Kim)	

# ACS Top Contributor in KOREA

## ACS Nano Summit 2024 at NANOKOREA

### ACS Top Contributor in KOREA

It is with great pleasure that I write to invite you to the ACS Top Contributors in Korea at ACS Nano summit session held with NANO KOREA 2024, on July 4<sup>th</sup>, 2024.

Award ceremony participants are Prof. Taeghwan Hyeon (SNU), Prof. Yang-Kook Sun (Hanyang Univ.), Prof. Sang Ouk Kim (KAIST), Prof. Han Young Woo (Korea Univ.), Prof. Cheolmin Park (Yonsei Univ.), Prof. Hu Young Jeong (UNIST), Prof. Chong Min Koo (SKKU), Prof. Ho Won Jang (SNU), Prof. Hyunhyub Ko (UNIST), Prof. Bumjun Kim (KAIST), Prof. Sunkook Kim (SKKU), Prof. Young Hee Lee (SKKU) and Prof. Il-Doo Kim (KAIST).

I look forward to seeing you at the ACS Nano Summit on July 4th.

Yours sincerely,  
Prof. Il-Doo Kim and Xiaodong Chen



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### About ACS NANO

ACS Nano is an international forum for the communication of comprehensive articles on nanoscience and nanotechnology research at the interfaces of chemistry, biology, materials science, physics, and engineering. Moreover, the journal helps facilitate communication among scientists from these research communities in developing new research opportunities, advancing the field through new discoveries, and reaching out to scientists at all levels.



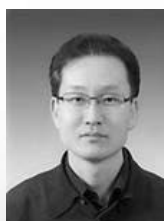
Taeghwan Hyeon  
SNU



Yang-Kook Sun  
Hanyang Univ.



Sang Ouk Kim  
KAIST



Han Young Woo  
Korea Univ.



Cheolmin Park  
Yonsei Univ.



Hu Young Jeong  
UNIST



Chong Min Koo  
SKKU



Ho Won Jang  
SNU



Hyunhyub Ko  
UNIST



Bumjun Kim  
KAIST



Sunkook Kim  
SKKU



Young Hee Lee  
SKKU



Il-Doo Kim  
KAIST

## [ACS] Poster Session

<b>Date &amp; Time</b>	July 4(Thu.), 2024 / 10:30–12:00
<b>Place</b>	Exhibition Hall 4,5

### ACS\_P\_1

#### Strategies for Halide Perovskites-Based Functional Memristors towards Realization of Large-Scale Crossbar Array

In Hyuk Im and Ho Won Jang  
(*Seoul National University*)

### ACS\_P\_2

#### Electrochemical Cycling Performance of Lithium Metal Batteries with a Two Dimensional TiO<sub>2</sub> Nanosheet Coating Layer

Jun Seo Park<sup>1</sup>, Sang Eun Lee<sup>1</sup>, Donghyoung Kim<sup>2</sup>, Mohammad Nasir<sup>1</sup>, Hyung Mo Jeong<sup>2</sup>, and Hee Jung Park<sup>1</sup>  
(<sup>1</sup>Dankook University, <sup>2</sup>Sungkyunkwan University)

### ACS\_P\_3

#### Particle Size Control of NMP-Based Lonomer Dispersions via Multi-Frequency Sonication

Hyuk Jun Kwon<sup>1,2</sup>, Joon Myung Choi<sup>2</sup>, and Ki RoYoon<sup>1</sup>  
(<sup>1</sup>KITECH, <sup>2</sup>Hanyang University)

### ACS\_P\_4

#### Development of Carbon Nanofiber–Carbon Nanotube Integrated Gas Diffusion Electrode using Electrospinning

Suyeon Bae<sup>1</sup>, Changho Lee<sup>1</sup>, Caroline Sunyong Lee<sup>2</sup>, and Kiro Yoon<sup>1,2</sup>  
(<sup>1</sup>KITECH, <sup>2</sup>Hanyang University)

### ACS\_P\_5

#### Multi-Frequency Ultrasonic Dispersion of Carbon Nanotubes as Cathode Additives for the High-Performance Li-Ion Batteries

Changho Lee<sup>1</sup>, Seo Won Song<sup>1</sup>, Seoyoon Shin<sup>2</sup>, Kwang Won Kim<sup>1</sup>, and Ki Ro Yoon<sup>1</sup>  
(<sup>1</sup>KITECH, <sup>2</sup>KICET)

### ACS\_P\_6

#### Internally Connected Porous PVA/PAA Membrane with Cross-Aligned Nanofiber Network for Facile and Long-Lasting Ion Transport in Zinc–Air Batteries

Kwang Won Kim<sup>1,2</sup>, Seon-Jin Choi<sup>2</sup>, and Ki Ro Yoon<sup>1,2</sup>  
(<sup>1</sup>KITECH, <sup>2</sup>Hanyang University)

#### ACS\_P\_7

##### **MXene/CNT Janus Film for Multifunctional Electromagnetic Shielding**

Tufail Hassan<sup>1</sup>, Nilufer Cakmakci<sup>2</sup>, Youngjin Jeong<sup>2</sup>, and Chong Min Koo<sup>1</sup>

(<sup>1</sup>Sungkyunkwan University, <sup>2</sup>Soongsil University)

#### ACS\_P\_8

##### **Advanced EMI Shielding and Joule Heating Capabilities of High Conductivity MXene/Polyurethane Nanocomposite**

Seunghwan Jeong and Chong Min Koo

(Sungkyunkwan University)

#### ACS\_P\_9

##### **Effective Lubricating Effect of OD Nanodiamonds for Highly Bendable and Stretchable Graphene Liquid Crystalline Fibers**

Jin-Hyo Kim, Jin Goo Kim, and Sang Ouk Kim

(KAIST)

#### ACS\_P\_10

##### **Centrifugal Spun Polyimide Nanofiber Protection Layer Separator for Lithium-Ion Batteries**

Dae-Kwon Boo and Ji-Won Jung

(University of Ulsan)

#### ACS\_P\_11

##### **Nb<sub>2</sub>CT<sub>x</sub> MXene for Fast Charging Lithium Metal Batteries**

Shakir Zaman and Chong Min Koo

(Sungkyunkwan University)

#### ACS\_P\_12

##### **Nano-Physical Unclonable Function Created by Nanopatterns from Block Copolymer Self-Assembly**

Hyeon Ju Ko, Jang Hwan Kim, and Sang Ouk Kim

(KAIST)

#### ACS\_P\_13

##### **Enhancing Ferroelectric Thin Film Transistor Performance with Epitaxial Yttrium-Doped Hafnium Zirconium Oxide as Dielectric Layer**

J. Y. Kim and H. W. Jang

(Seoul National University)

#### ACS\_P\_14

##### **Biomimetic Skin System Utilizing Artificial Mechano-Nociceptors based on Halide Perovskite Diffusive Memristors**

Ji Hyun Baek, In Hyuk Im, and Ho Won Jang

(Seoul National University)

### ACS\_P\_15

#### Human-Muscle-Inspired Single Fibre Actuator with Reversible Percolation

Sehwan Shin, Inho Kim, and Sangouk Kim

*(KAIST)*

### ACS\_P\_16

#### Stretching Process Control of ePTFE-Based Porous Supports for Durable PEM Water Electrolysis and Fuel Cells

Daehwan Kang<sup>1,2</sup>, Byungil Hwang<sup>2</sup>, and Ki Ro Yoon<sup>1</sup>

*(<sup>1</sup>KITECH, <sup>2</sup>Chung-Ang University)*

### ACS\_P\_17

#### Advancements in Cartilage Regeneration: Iron Oxide-Embedded Schiff Base Hydrogels for Sustained Drug Delivery

Youngjun Choi<sup>1</sup>, Dong-Wook Han<sup>1</sup>, and Honghyun Park<sup>2</sup>

*(<sup>1</sup>Pusan National University, <sup>2</sup>KIMS)*

### ACS\_P\_18

#### Value-Addition of Petroleum Refining Waste into High-Performance and Waste-Based Infrared Polarizer via Nanofabrication

Woongbi Cho<sup>1</sup>, Jehwan Hwang<sup>2</sup>, Sang Yeon Lee<sup>3</sup>, Jaeseo Park<sup>4</sup>, Nara Han<sup>3</sup>, Chi Hwan Lee<sup>2</sup>, Sang-Woo Kang<sup>4</sup>, Augustine Urbas<sup>5</sup>, Jun Oh Kim<sup>4</sup>, Zahyun Ku<sup>5</sup>, and Jeong Jae Wie<sup>1</sup>

*(<sup>1</sup>Hanyang University, <sup>2</sup>Purdue University, <sup>3</sup>Inha University, <sup>4</sup>KRISS, <sup>5</sup>Air Force Research Laboratory)*

### ACS\_P\_19

#### Large-Scale Production of ZnO QDs via Hydrodynamic Cavitation Technique

Taiyu Jin<sup>1</sup>, Haishuo Wu<sup>1</sup>, Il-Doo Kim<sup>2</sup>, and Da-Wei Fang<sup>1</sup>

*(<sup>1</sup>Liaoning University, <sup>2</sup>KAIST)*

### ACS\_P\_20

#### Joule-Heating Assisted Efficient Synthesis of Co<sub>4</sub>S<sub>3</sub>/Co<sub>9</sub>S<sub>8</sub> Nano-Catalyst on Carbon Nanofiber for Enhanced Li-Polysulfide Conversion and Prolonged Cycle Performance in Lithium-Sulfur Batteries

Seongcheol Ahn, Minsoo Kim, and Il-Doo Kim

*(KAIST)*

### ACS\_P\_21

#### Design Strategy of Hollow Porous Carbon Nanomaterial Derived from PS@ZIF for Enhanced Electrocatalytic Activity

Heejun Park, Jong Won Baek, and Il-Doo Kim

*(KAIST)*



#### ACS\_P\_22

##### Highly Stable Lithium Metal Anode based on Ultra-Thin Nanofiber Protection Layer

Yujang Cho, Heejun Park, and Il-Doo Kim

(KAIST)

#### ACS\_P\_23

##### Template-Free Electrochemical Growth of Vertical Single-Crystalline Cu Nano-Wires for BEOL Interconnection

Jae Wook Lee and Jae Yong Song

(POSTECH)

#### ACS\_P\_24

##### Empowering Polysulfide Control in Lean Electrolyte Lithium-Sulfur Batteries with Nickel-Cobalt Alloy Nanoparticles and Metal Oxide Nanoparticles

Chaiwon Lee and Jang-Yeon Hwang

(Hanyang University)

#### ACS\_P\_25

##### Revealing the Nucleation and Interfacial Deposition Rates of Sulfur/LiPolysulfide on Carbonaceous Materials with Controlled Graphitization Levels in Lithium-Sulfur Batteries

M.S. Kim<sup>1</sup>, J.S. Nam<sup>1</sup>, S.H. Cho<sup>2</sup>, J.W. Jung<sup>3</sup>, and I.D. Kim<sup>1</sup>

(<sup>1</sup>KAIST, <sup>2</sup>NNFC, <sup>3</sup>University of Ulsan)

#### ACS\_P\_26

##### Direct Electricity Generation from Directional Migration of Ion through MXene-Based Nanochannel

Sangyun Na, Geonyoung Jung, Yoojin Chang, and Hyunhyub Ko

(UNIST)

#### ACS\_P\_27

##### Ultrathin $\text{Ti}_3\text{C}_2\text{T}_x$ MXene Film-Type Shape-Configurable Thermoacoustic Loudspeakers with Tunable Sound Directivity

Geonyoung Jung, Jinyoung Kim, and Hyunhyub Ko

(UNIST)

#### ACS\_P\_28

##### Plasmonic Hydrogel Actuators for Octopus-Inspired Photo/ThermoResponsive Smart Adhesive Patch

Jeeyoon Kim, Jeonghee Yeom, Yun Goo Ro, Geoseong Na, Woonggyu Jung, and Hyunhyub Ko

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#### ACS\_P\_29

##### Replicating Cicada Wing Nanostructure through Electrohydrodynamic Instability in Extended Mode

Hyunje Park, Heejoon Chae, and Dae Joon Kang

(Sungkyunkwan University)

### ACS\_P\_30

#### Direct-Contact Annealing for Carbon Nanooion Synthesis with Photothermal Agents

Dogyeong Jeon, Hamin Shin, Jun-Hwe Cha, and Il-Doo Kim

*(KAIST)*

### ACS\_P\_31

#### Exploring Cutting-Edge Hyperbolic Dispersion in Semicrystalline Conjugated Polymers via First-Principles Calculations

Suim Lim<sup>1,2</sup>, Yeon Ui Lee<sup>3</sup>, and Kanghoon Yim<sup>1</sup>

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### ACS\_P\_32

#### Efficiency Enhancement of InGaP/GaAs Double-Junction Thin Film Solar Cell using TiO<sub>2</sub> Nanotextured Surface

Hyo Jin Kim, Gwang Yeol Park, and Woo Yong Jeong

*(KOPTI)*

### ACS\_P\_33

#### 2D Heterointerface-Entrapped Pt Single-Atoms for Exceptionally Stable Hydrogen Evolution Catalysts

Mingyu Sagong, Hamin Shin, Jaewoong Lee, Jihan Kim, and Il-Doo Kim

*(KAIST)*

### ACS\_P\_34

#### Atmospheric Moisture-Driven Electricity Generators using Asymmetric Hygroscopic Materials for Wound Healing

Yeji Han, Yujang Cho, Min Soo Kim, Seongcheol Ahn, and Il-Doo Kim

*(KAIST)*

### ACS\_P\_35

#### Enhanced Stability and High Energy Density Lithium Metal Batteries via Multifunctional SiO<sub>2</sub>@Cu Nanofiber Membrane Infusion

Heejun Park and Il-Doo Kim

*(KAIST)*

### ACS\_P\_36

#### Colorimetric Sensing Array and Nano-Fiber Yarn for Distinguishing Carbonyl Groups

Donghyun Kim, Jinho Lee, Seongcheol Ahn, Chungseong Park, Euichul Shin, and Il-Doo Kim

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