

Solar-to-Fuel Conversion: from Photocatalysis to Photothermal Catalysis

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Solar-driven photocatalysis offers a potential solution to the problems of energy shortage and environmental pollutions, yet the activity is hampered by the kinetically complex and energetically challenging multi-electron reaction [1]. Recent years, photothermal catalysis based on the plasmonic nanomaterials, has become a rapidly developing and exciting research field due to its enormous advantage in solar spectrum utilization [2]. Sunlight, including UV, visible and infrared light can be utilized by plasmonic catalysts not only to induce local heating but also to generate energetic hot carriers for initiating surface catalytic reactions and/or modulating reaction pathways, resulting in synergistically promoted solar-to-fuel conversion efficiencies [3].

This talk will introduce the latest research advances in the field, focusing on our challenges on the scientific and technological possibilities of nano-materials for solar fuel conversion [4-8]. Efforts to explore suitable photoactive materials and to control their surface/interface structure to achieve a synergistic effect of efficient sunlight absorption and high catalytic activity/selectivity will be introduced. Meanwhile, the reactor design as well as energy management of photothermal system are highly demanded towards practical application of photothermal catalysis, especially under the condition of natural sunlight irradiation. The current understanding of key aspects of solar fuel conversion, as well as the crucial issues that should be addressed in future research activities will also be introduced and discussed.

References:

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