Plasmon-Enhanced Photoelectrochemical Fuel Generation

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The annual energy consumption continues to increase, which causes “green house” effect. This demands the generation of clean fuels from renewable resources. Photoelectrochemical and photocatalytic generation of fuels holds great potential. Commercialization of photoelectrochemical cells (PECs) and photocatalysts is hindered by the limited energy conversion efficiency. Incorporation of plasmonic nanostructures into the PECs can improve the energy conversion efficiency. This presentation will deal with the relationship among the energy efficiency, the charge transfer, the energy transfer and the microstructure of photoelectrodes, photocatalysts and solar energy materials. This talk will present the newly discovered plasmon-induced resonant energy transfer mechanism (PIRET) in the metal-semiconductor hetero-junctions [1,2]. Our recent work has demonstrated that the plasmonic energy can transfer from metals to semiconductors via the PIRET and/or direct hot-electron transfer processes. The discovery of plasmonic sensitizers has provided new opportunities to develop PECs for fuel production from renewable resources. This presentation shows that plasmonic nanostructures can act as photo-sensitizers to enhance the performance of PECs

References

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Acknowledgement:
This work was supported by the National Science Foundation (CBET-1233795)