Plasmonic Harvesting of Solar Energy for Chemical Reactions

By
Prof. Jianfang Wang
Department of Physics, The Chinese University of Hong Kong, Shatin, Hong Kong SAR, China

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Abstract

The efficient use of solar energy has received wide interests due to the increasing energy and environmental concerns. In addition to the tremendous efforts made on improving the efficiencies of photovoltaic and solar heating devices, the exploration of new solar energy harvesting means will also have long-term impacts. A potential way in the field of chemistry is sunlight-driven catalytic reactions. In this presentation, I will report on the direct harvesting of light from the visible to near infrared region for chemical reactions by use of plasmonic Au-Pd nanostructures, which serve simultaneously as an energy converter and a catalyst for Suzuki coupling reactions. The plasmonic excitation enables and accelerates the targeted catalytic reaction through plasmonic photocatalysis and plasmonic photothermal heating. The intimate integration of the plasmonic energy converter and the catalyst facilitates the efficient light energy conversion and utilization. The effect of plasmonic photocatalysis becomes more important when the incident light is at the plasmon resonance wavelength or the resonant incident light power is increased.

Short Biography

Professor Jianfang Wang, currently an Associate Professor in Department of Physics of The Chinese University of Hong Kong, obtained his BS degree in inorganic chemistry in 1993 from University of Science and Technology of China and MS degree in inorganic chemistry in 1996 from Peking University. He obtained his PhD degree in physical chemistry in 2002 from Harvard University. He was a postdoctoral researcher at University of California, Santa Barbara from February 2002 to July 2005. His current research interests include the plasmonic and catalytic properties of metal nanocrystals, plasmonic harvesting of solar energy, and nanostructured functional metal oxide materials.