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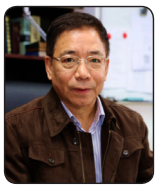
Abstract



Solar fuel production: opportunities for nanostructures

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Abstract:
The photocatalytic and photoelectrochemical reduction of water or CO2 is an intriguing approach to producing sustainable solar fuels, and has attracted growing and intense interest. Nanostructuring of photocatalysts and photoelectrodes has been proven to be a strong strategy to dramatically improve overall solar-to-fuel conversion efficiencies. Another technological barrier for the practical implementation of solar fuel production is long-term material durability, which has recently been well addressed by using conformal coatings of protective layers onto the narrow band-gap semiconductors that are suitable for efficient solar-to-fuel conversions but photoelectrochemically unstable. These significant progresses may lead us to the practical implementation of solar fuel production. We focused on the exciting progresses achieved by using nanostructuring strategies, specifically regarding how the nanostructure influences the charge transport and separation. Special attention was paid to investigate how a nanoscale coating (overlayer) passivates the surface states, thereby reducing the surface electron hole recombination, and how a nanoscale coating (protective layer) prevents the photocorrosion or photopassivation of the semiconductors with optimal band gaps. We hope that the design strategies using these nanostructures will offer new and greater opportunities for efficient solar fuel production to existing photocatalytic and photoelectrochemical systems.

Biography:
Zhigang Zou received his Ph.D. degree in 1996 from the University of Tokyo. He is the Cheung Kong Scholars professor in the department of physics, and the director of Ecomaterials and Renewable Energy Research Center (ERERC) in Nanjing University, China. His research interests include superconductor, photocatalysis, and photoelectrochemisty for solar fuel

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