

Perspectives of Solar-Driven Hydrogen Production

Samuel S. Mao

University of California at Berkeley and Lawrence Berkeley National Laboratory

This presentation will provide an overview of recent progress in the development of oxide-based photocatalytic and photoelectrochemical approaches for solar-driven production of hydrogen from water. The emphasis will be recent realization of disorder-engineered titanium dioxide, starting with an introduction of the electronic band structure resulted from disorder incorporation. The method of making disorder-engineered titanium dioxide nanocrystals will be presented, followed by measurements of their structural, electronic, and optical properties. Photocatalysis experiments based on solar-driven hydrogen production using disorder-engineered titanium dioxide nanocrystals, that can absorb solar energy in both visible and infrared wavelength regions, will be summarized, followed by a perspective of the research field of using oxide materials for solar-driven hydrogen production.