Solar-driven H_2 Evolution with Surface-modified Colloidal Cd-free Quantum Dots

Wang Nianfang, 이도창†
KAIST
(dclee@kaist.edu†)

Solar-driven hydrogen evolution is a research topic of great significance for solving the global energy problem by storing abundant solar energy into hydrogen fuel. Inspired by photosynthesis of green plants in nature, hydrogen can be produced through artificial photosynthesis process using solar energy as a driving force to promote reduction of water into hydrogen, coupled with oxidation of a substrate. Waste biomass (lignocellulose) have been considered as ideal oxidation substrates to promote H2 generation through photocatalytic reforming, which can be an ideal access to both solar-to-H2 energy conversion and environmental remediation. Colloidal semiconductor quantum dots (QDs) with their tunable absorption spectrum potentially covering the majority (UV-visible-NIR) of solar spectrum is a promising light absorber candidate for PR conversion. Moreover, their large surface to volume ratio provides tremendous active sites for the photo-redox reactions. In this work, we focus on control the behavior of redox charge equivalents to promote the H2 generation with consumption of lignocellulose and its feedstocks by elaborate modification of the QDs surface.