

Advanced inorganic materials for photoelectrochemical energy devices

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Photoelectrochemical (PEC) energy devices such as dye-sensitized solar cells, quantum dot (QD)-sensitized solar cells, and solar water splitting have attracted a great amount of attention as future green energy sources. For the superior performances of these energy devices, it is important to develop highly efficient materials for the photosensitizers and carrier transport layers. In this talk, advanced inorganic materials for the highly efficient and low-cost PEC energy devices will be introduced. Especially, we have applied PbS/Mn-doped CdS QDs and Cu-In-Se QDs to the solar cells and solar water splitting. These QDs exhibited greatly high photocurrent and conversion efficiency. In addition, we have developed Pt-free electrocatalysts for application in solar cells as low-cost counter electrodes. Carbon-based materials, metal sulfides, and metal nitrides were prepared and applied. In particular, new counter electrodes based on CoN showed comparable PEC performances as the Pt counter electrode.