Application of quantum dot photosensitizers to solar energy conversion

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Quantum dots (QDs) are attractive photosensitizer candidates because of their unique optoelectronic properties, which include a high absorption coefficient, band gap tunability, and potential multiple exciton generation. Furthermore, low-band-gap (< 1.5 eV) QDs, such as PbS, Cu-In-Se QDs, can absorb over a wide spectral range, including the near-IR region. In this talk, the application of QD photosensitizers to the solar energy conversion including solar cells and photoelectrochemical (PEC) water splitting. Firstly, we preapred PbS/Mn-doped CdS QDs for application both in solar cells and PEC water splitting. Particullary, the effects of Mn-doping on the PEC properties were analyzed in detail. In addition, we applied the non-toxic QDs such as Cu-In-Se to solar cells and PEC water splitting. In this case, the role of ZnS overlayers on the surface of photoanode was systemically investigated.