Highly efficient type-II CdSe/ZnTe hetero core/arm tetrapod structure QD sensitized photoelectrochemical cells for water-splitting

이석원, 이도창†
KAIST
(dclee@kaist.edu†)

We synthesized CdSe/ZnTe core/arm tetrapod (C/A-TP) quantum dots (QDs) as a sensitizer in photoelectrochemical cells (PECs). First of all, The type-II heterojunction between CdSe and ZnTe can increase the lifetime of excitons due to the efficient charge separation. In addition, unlike typical core/shell QDs, the C/A-TPs have the open structure from the core, which could facilitate the hole extraction by electrolytes in the PECs. Furthermore, electrons can efficiently trasnport into TiO2 electrodes, through 1-D long arms. Here, to identify how efficiently this heterostructure C/A-TP QDs are working for PEC watersplitting as a sensitizer, we depositied them on inverse opal (IO) TiO2 electrodes. Because of the interconnected macropores of IO TiO2, We successfully sensitized C/A-TP on IO-TiO2. We firstly compared CdSe/ZnTe and ZnTe/CdSe C/A-TPs in PECs to shed light on how the arrangement of electronic structures could affect the charge injection into TiO2. Also, we tried to uncover the advantage of the C/A-TPs over the confined core/shell structure due to the their open structure.