

water splitting photoelectrochemical cell with CuInS₂/CdS/ZnO heterostructure

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Photoanodes prepared using CuInS₂/CdS/ZnO nanowires were fabricated by a solution-based process for constructing a photo-driven hydrogen generation system. For efficient light harvesting and photoexcited charge collection, ZnO nanowire (NW) photoanode arrays were co-sensitized with CdS and CuInS₂ (CIS). A CdS layer was deposited on the ZnO NW via successive ion layer adsorption and reaction (SILAR), and the CIS layer was prepared by depositing a molecular precursor solution onto the CdS/ZnO NW. The generated anodic photocurrent was increased with the subsequent deposition of the CIS and CdS layers. Ultraviolet photoelectron spectroscopy analysis revealed cascade type-II band alignments for the CIS/CdS/ZnO NW photoanodes, which enabled efficient electron collection. Our heterostructure photoelectrode has generated a greatly improved photocurrent density of 13.8 mA cm⁻² at 0.3 V vs. SCE under 1 sun illumination.