

ZnS(en)_{0.5}-CdS-WO₃ composites with enhanced photocatalytic hydrogen production

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Photocatalyst is a substance that converts solar energy into chemical energy. Photocatalytic materials for hydrogen generation from water splitting have attracted a lot of attention not only because it has environmental advantages but also because it substitutes fossil fuels. If photocatalyst absorbs solar energy more than the band gap, electron-hole pair is generated. The electron is placed in the conduction band and the hole is placed in the valence band. Excited electron can be used for hydrogen production and consequently hole can produce oxygen. However, materials with wide band gap cannot generate electron-hole pair because most solar light composes of visible light and infrared. In contrast, although narrow band gap materials could produce electron-hole pair, the efficiency of hydrogen production is very low due to recombination that excited electrons react with holes without any production. Therefore, band gap engineering is important, and we synthesized ternary photocatalyst using ZnS, CdS, and WO₃. Photocatalytic efficiency was measured by a 150 W xenon lamp with an AM 1.5G filter and gas chromatography. Also, UV-vis spectroscopy and FT-IR were used for characterization.