

Nanocomposites and nanomaterials

Dye-Sensitized Cu₂WS₄ Nanocubes for Efficient Photocatalytic Hydrogen Evolution from Water

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Dye sensitization is a powerful strategy to enable the visible-light harvesting of wide band gap semiconductors [1]. Copper-based ternary and quaternary chalcogenides of earth-abundant elements have recently emerged as promising alternative materials for solar energy conversion due to their outstanding photovoltaic and photocatalytic properties [2].

In this study, we reported that a new approach to synthesis Cu₂WS₄ nanocubes with hot injection method to decrease the reaction time and required pressure. These Cu₂WS₄ nanocubes efficiently catalyze the photocatalytic hydrogen evolution reaction by triethanolamine (TEOA) and Eosin-Y (EY) as the electron donor and sensitizer, respectively. Cu₂WS₄ nanocubes exhibit a good photostability in the hydrogen evolution more than 8 hour under visible light irradiation. This work opens new perspectives for the investigation of other ternary sulfide compounds for the photocatalytic hydrogen evolution without using noble metals.

1. Zhang X., Peng T., Song S., Recent advances in dye-sensitized semiconductor systems for photocatalytic hydrogen production // J. Mater. Chem. A.-2016.-4.-P. 2365-2402

2. Aldakov D., Lefrancois A., Reiss P., Ternary and quaternary metal chalcogenide nanocrystals: synthesis, properties and applications // J. Mater. Chem. C.-2013.-1.-P. 3756-3776