

عنوان مقاله:

Effect of Transition Metal Doping on Photocatalytic Activity of WO₃ Nanorods for Enhanced Photoelectrochemical Water Splitting

محل انتشار:

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خلاصه مقاله:

Developing highly efficient photocatalysts toward the efficient oxygen evolution reaction (OER) is highly desirable for photoelectrochemical (PEC) water splitting. WO₃ is one of the promising n-type semiconductor materials that has received considerable attention for photoelectrochemical (PEC) water splitting. However, WO₃ suffers from poor charge separation and fast recombination of photo-generated electron-hole pairs, which leads to a decrease in its ability to carry out water splitting. In this study, we fabricate Fe and Co-doped WO₃ nanorods photoanodes to improve its photocatalytic properties for photoelectrochemical oxygen evolution. Fe and Co-doped WO₃ NRs were synthesized using a facile hydrothermal method without a seed layer. Based on linear sweep voltammograms (LSV) results, the Co-doped WO₃ NRs show higher photocurrent density (0.30 mA cm⁻²) in comparison with Fe-doped WO₃ NRs (0.03 mA cm⁻²) and undoped WO₃ NRs (0.12 mA cm⁻²) under LED illumination (Δ mW cm⁻²). Also, Tafel analysis and impedance measurements proved that Co-doped WO₃ NRs can be a suitable candidate for PEC applications due to its lower Tafel slope (376 mV dec⁻¹) and its smaller charge transfer resistance (867.5 Ω). Overall, our results provide valuable insights into fabricating doped WO₃ photoanodes for more efficient PEC water-splitting capabilities

کلمات کلیدی:

WO₃ nanorods, Fe-doped WO₃, Co-doped WO₃, photocatalysis, photoelectrochemical water splitting

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