

Ternary Metal Oxide Photocatalysts Synthesized Via Sonochemical Process

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Abstract

Functional ternary metal oxide compounds including ZnTiO₃ and visible light driven BiVO₄ photocatalysts were synthesized via facile sonochemical process using intense ultrasonic energy to expedite chemical reaction and particle formation. Their photocatalytic activities of the compounds can be enhanced by incorporation with selective dopants including Co, Mn, Ni for ZnTiO₃ and Fe, Er and Yb for BiVO₄ and by composite forms with proper compounds. The effects of dopants and incorporated compounds on their relevant properties and photocatalytic performance were extensively scrutinized. X-ray absorption spectroscopy was employed to further investigate in detail the role of dopants in host material by means of oxidation states and local structures. It is suggested that the dopants can result in the band gap narrowing, increasing photon absorption, and phase transformation of the host leading to significant photocatalytic enhancement. Meanwhile, Composite compounds can effectively assist the retardance of electron-hole pair recombination, hence improving photocatalytic activity of the catalysts.

Keyword: Sonochemical process, Ternary metal oxide compounds, Photocatalyst