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High performance plasmonic activation of Ag on β - $\text{Ag}_2\text{WO}_4/\text{BiVO}_4$ as nanophotocatalyst for oxidation of alcohols by incident visible light

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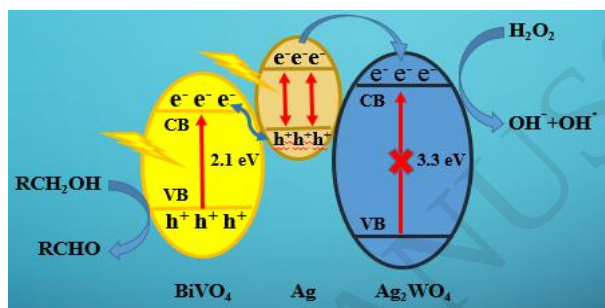
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Graphical abstract

Plasmonic nanophotocatalyst $\text{Ag}/\beta\text{-Ag}_2\text{WO}_4/\text{BiVO}_4$ with high photocatalytic performance toward alcohols oxidation upon visible light incident



Research highlight

- ❖ Synthesis a novel and stable plasmonic nanophotocatalyst $\text{Ag}/\beta\text{-Ag}_2\text{WO}_4/\text{BiVO}_4$ by a facile method
- ❖ A nanocomposite with excellent charge transfer and charge separation in photo process
- ❖ High photocatalytic performance toward aldehyde producing under visible light irradiation
- ❖ High and constant photoelectrochemical current at low applied potential with efficient surface plasmon resonance upon light absorption
- ❖ A plausible photocatalytic mechanism through photo generated holes and $\text{OH}^\bullet$ radicals

Abstract

A new and high efficient ternary Ag on $\beta\text{-Ag}_2\text{WO}_4/\text{BiVO}_4$ as a visible light driven nanophotocatalyst toward oxidation of alcohols was synthesized by the ultrasonic irradiation in combination with hydrothermal decomposition method. This photosensitive catalyst was characterized using FT-IR, FE-SEM imaging, TEM, EDS, XRD, XPS, UV-Vis, PEC and PL techniques. The photocatalytic performance of this nanocomposite is more than 90% conversion that significantly is higher than either pure $\text{Ag}/\beta\text{-Ag}_2\text{WO}_4$ or BiVO_4 nanoparticles. This such high activity is related to efficient charge separation that could be contributed to the fast charge transfer

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