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Synthesis and phase transformation studies of dysprosium doped $\text{Bi}_4\text{V}_2\text{O}_{11}$ nanoparticles and its application in visible-light photocatalytic degradation of Tetracycline drug

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$\text{Bi}_4\text{V}_2\text{O}_{11}$ as an electrolyte material has attracted significant attention for recent years due to its outstanding novel advantages. In this article novel, Dysprosium doped ($x= 0.2, 0.3, 0.4, 0.5$) $\text{Bi}_4\text{V}_2\text{O}_{11}$ (Dy/BVO) nanoparticles have been synthesized through a sol-gel method. The Dy/BVO nanoparticles present excellent visible light absorption by UV-Vis diffuse-reflectance spectra. The as-prepared photocatalyst Dy/BVO nanoparticles exhibit higher photocatalytic efficiency than BVO nanoparticles evaluated by degradation of Tetracycline drug under visible light irradiation. Our work focuses on the phase transformation, conducting properties and mechanisms

of the Dy/BVO nanoparticles in relation to execute some methods of processing and manufacturing product in commercial applications. The characterization of Dy/BVO was performed by FT-IR, XRD, SEM, EDAX and UV-vis analysis. AC Impedance spectroscopy was used to analyse the conducting behaviour of synthesised nanoparticles in the temperature range 100-600°C. The photocatalytic activity revealed that Dy/BVO remarkably enhanced the photocatalytic activity. This is the first report that Dy/BVO, can destroy the drug effluent which is coming from the drug industry and also worried about the human health hazards.

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