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Fabrication of Novel BiOX/Sb2WO6 Heterostructures with Enhanced Visible Light Activity and Improved Stability towards Degradation of AZO Dyes

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Abstract—*Novel xBiOX/ySb_2WO_6 heterostructures (x/y = 0.1, 0.2, 0.3, 0.4) were prepared under solvothermal conditions and were implemented as UV-vis photocatalysts for the degradation of azo-dye PBS. The phase structure, morphology and optical properties of as prepared heterostructures were studied by multiple characterization tools including X-ray diffraction (XRD), scanning electron microscopy (SEM), high resolution transmission electron microscopy (HRTEM), selected area electron diffraction (SAED), FTIR, N_2 adsorption-desorption isotherms (BET) and UV-visible diffuse reflectance spectroscopy (UV-DRS). The characterization results suggest that pure Sb_2WO_6 consist of uniform flat elipsoids with typical size of 500 nm width and 200 nm thicknesses. The heterostructures show square shaped nanosheets of BiOX also present in the composites. The new xBiOX/ySb_2WO_6 heterostructures exhibited enhanced light absorption and displayed superior photocatalytic activity for the degradation of typical organic pollutants such as Ponceau BS (PBS) The optimal Bi/Sb molar ratio in xBIOX/Sb2WO6 heterostructures) was found to be 0.3. The enhanced photocatalytic activity of composites was attributed to efficient separation of electron–hole pairs derived from matching band potentials between BiOX and Sb_2WO_6. Moreover, the as-synthesized samples showed great stability and did not show any significant loss of activity even after 5 cyclic runs*

Keywords*: heterostructure, Organic pollutants, Ponceau BS (PBS), band potential, composites, solvothermal.*