

ABSTRACT

In present research study, co-precipitation method was used to obtained novel bismuth oxyiodide quantum dots (BiOI QDs) with incorporation of various concentrations (3, 6 and 9%) of polyvinylpyrrolidone (PVP) as a dopant. Number of characterizations was employed to check the structural, morphological and optical properties of prepared samples. The hexagonal structure of BiOI has been confirmed by using x-ray diffraction (XRD) investigation. In addition, with increasing dopant concentration significant decreased in crystallite size was observed as 44.5, 19.9, 25.8 and 23.2 nm. Micrographs of QDs were obtained using transmission electron microscope (TEM). FTIR spectra have been utilized to establish the existence of functional groups in addition to recording the vibrational characteristic peak of BiOI. The bandgap energy increased gradually upon doping in the range of 2.86-2.93 eV. The dye degradation of toxic methylene blue (MB) has been examined by applying doped and host BiOI nanocatalyst in the appearance of sodium borohydride (NaBH_4). Dye elimination was found to increasing with dopant concentration as 9 % PVP doped BiOI explored as a superior catalyst providing high MB degradation rate 99.50 % in basic medium within seconds. Additionally, the antibacterial activity was tested against staphylococcus aureus (*S. aureus*) and Escherichia coli (*E. coli*) pathogens; significant inhibition zone was measured against *S. aureus* bacteria as 4.60 mm.