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## Environmental remediation of Cr(VI) solutions using Ni-bismuth oxyiodide nanospheres

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### Abstract

Bismuth oxyiodide (BiOI) nanospheres were prepared using a facile solvothermal method. Nickel was doped into the surface of the BiOI nanospheres using a photoassisted deposition method. Various characterization techniques, such as X-ray diffraction (XRD), PL, UV-vis, XRD, transmission electron microscope and BET surface area analyses, were used to characterize the BiOI nanosphere and Ni-BiOI nanosphere samples. The photocatalytic performance of the BiOI nanosphere and Ni-BiOI nanosphere samples was studied for the reduction of Cr(VI) to Cr(III) under visible light irradiation. The results indicated that the weight per cent of doped nickel plays an important role in controlling the band gap of bismuth oxyiodide and hindering the electron-hole recombination rate. The addition of nickel decreased the band gap from 2.7 to 2.16eV due to a decrease in the weight per cent of nickel from zero to 0.8wt%, respectively. In addition, the BET surface area of the BiOI nanospheres decreased from 145 to 128m<sup>2</sup>/g as the weight per cent of nickel increased from zero to 0.8wt%, respectively, due to blockage of BiOI nanosphere pores and doping with nickel. The X-ray photoelectron spectroscopy results indicate that nickel was doped as metallic nickel. The 0.6wt% Ni-BiOI nanosphere photocatalyst reduced Cr(VI) to Cr(III) within 30min, and its photocatalytic activity reached 100%. In addition, this catalyst can be used five times without loss of its photocatalytic activity.

### Keywords

**Author Keywords:** Bismuth oxyiodide; Ni doping; Photocatalyst; Cr(VI) reduction

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