

Electrodeposition of Bismuth Oxyiodide for Photoelectrochemical Applications

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Abstract

This study reports the electrodeposition of bismuth oxyiodide thin films on FTO substrates for the first time from aqueous nitrate baths. The electrodeposition process involves the reduction of Bi(III) to Bi(I), elemental iodine to iodide and simultaneous oxidation of iodide to oxyiodide. The key to obtaining bismuth oxyiodide is the control of concentrations of Bi(I), iodide and oxyiodide ions at the electrode surface. This is in turn achieved by appropriate choices of Bi(III) concentration, iodine concentration, the amount of a suitable polyol for complexing, bath pH and the potential of deposition of BiOI. It is shown that decreasing the Bi(III) ion concentrations in the bath promotes the formation of bismuth oxyiodide over bismuth triiodide on FTO. Cactus-like microspheres of the oxyiodide, made of nanoplates, are formed. UV-Visible spectroscopy shows an indirect band gap of 2.19 eV for the deposited oxyiodide. These films are currently being used to examine photo- electrochemical degradation of pollutants in water.