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Optical Characterization of Chemical Bath Deposited Bismuth Oxyiodide (BiOI) Thin Films

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Abstract: Thin films of Bismuth oxyiodide (BiOI) were deposited, using chemical bath deposition techniques. The films were characterized using energy dispersive x-ray fluorescence (EDXRF) and Fourier transform infrared (FTIR) spectroscopy for chemical composition, and a spectrophotometer for the analysis of spectral absorbance / transmittance / reflectance. Deposited film thickness ranged between 0.115 and 0.140 μ m. The optical properties deduced from the spectral absorbance / transmittance / reflectance include the maximum values of the refractive index n that ranged between 2.62 and 2.64, the extinction coefficient k ranged between 25.84×10^{-3} and 42.92×10^{-3} while the Optical conductivity σ ranged between $0.60 \times 10^{14} \text{ S}^{-1}$ and $0.75 \times 10^{14} \text{ S}^{-1}$. The spectral analysis revealed that some of the films grown are poor transmitters of UV but have good transmission in the VIS-NIR regions. Some of the films show transmittance above 78% in the VIS-NIR regions and a wide band gap that ranged between 3.20 and 3.40 eV. In the mid infrared regions transmittance ranged between 3 and 37%. These properties make the film potential material for poultry protection and warming coatings, solar control and antireflection coatings and as well material for solar cell fabrication.

Key Words: Chemical bath deposition technique; Bismuth oxy iodide; poultry protection and warming coating; solar control and antireflection coatings and solar cells.

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