



Contribution ID: 358

Type: Poster Presentation

Growth and Characterization of Metallic Film Precursors for the Synthesis of CZTS Thin Films for Photovoltaic Applications

Thursday, 28 June 2018 15:00 (2 hours)

Copper Zinc Tin Sulphide (CZTS) thin films are materials of interest for low cost solar cells due to their suitable direct band gap of between 1.4 and 1.5eV, large absorption coefficient of over 10^4 cm^{-1} , abundance and low toxicity of the elements in the CZTS compound compared to the currently used compounds, such as copper indium selenide (CIS), copper indium gallium selenide (CIGS) and cadmium telluride (CdTe), which are rare and toxic. However, the suitability of CZTS materials under different radiation environments has not yet been tested. In this work, i.e., the first phase of CZTS synthesis, Cu-Zn-Sn film precursors, were deposited on glass substrate using electron beam deposition. The crystal structure of the synthesised film precursors were characterised by X-ray Diffraction (XRD) and elemental identification performed using Rutherford Backscattering Spectrometry (RBS). Moreover, ion beam energies and fluences to be used to study the radiation hardness capability of the grown CZTS thin films were simulated using the Transport of Ions in Matter (TRIM) code. The synthesis results obtained are in agreement with those presented in the literature indicating that the metallic CZT film precursors were successfully synthesised.

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Session Classification: Poster Session 2

Track Classification: Track A - Physics of Condensed Matter and Materials