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Synthetic process of cesium lead tri-iodide (γ-CsPbI3) perovskites thin-films using sequential physical vapor deposition method.

In this study, sequential physical vapor deposition (SPVD) technique is used to grow high poly-crystalline yellow active orthorhombic γ-CsPbI3 structure with Pnma space group. Crystallographic parameters and the phase transition from as-deposited orthorhombic (γ-CsPbI3) to tetragonal (β-CsPbI3) on annealing at 100 ℃ are determined using Rietveld refined X-ray diffraction (XRD) patterns. Computed lattice constants are a= 4.88 Å, b= 9.96 Å, and c= 16.52 Å, with an average crystallite size of 169.46 nm and micro-strains of 10ˆ16. Field emission scanning electron (FESEM) micrographs show uniform surface coverage with polycrystalline natured grains. Average grain sizes increased from 168 to 235 nm as CsI thickness increased, resulting in large pin-hole-free and tightly packed grains. From a Tauc's plot, UV-Vis spectra reveal a growing pattern in the electronic band structure from 2.24 to 2.38 eV for both as-deposited and annealed thin-films. Due to their high diffusion length (>1 m), high absorption coefficient (10ˆ5 cm), excellent charge transport properties, and high photostability, inorganic cesium lead triiodide (CsPbI3) thin-films have an invincible potential for future low-cost photovoltaic devices as they participate in tandem solar cells [1, 2].

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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