

عنوان مقاله:

Impact of solution pH on the physical properties of rare earth metal doped PbSe chalcogenide material for photovoltaic application

محل انتشار:

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خلاصه مقاله:

Zirconium doped Lead selenide (PbSe) nanocrystal films were synthesized on FTO substrates by electrodeposition technique, and analyzed by UV-Visible Spectrophotometer, four-point probes technique, scanning electron microscopy (SEM), X-ray diffractometer and Energy dispersive X-ray analysis (EDX). The results show that the synthesized Zr/PbSe films exhibited an increase in optical absorbance as the deposition pH increased, with the highest absorbance value in the UV region. The forbidden energy gap values of the synthesized films were observed to increase with an increase in deposition pH. A direct forbidden energy gap ranging from $(1.80-1.90)$ eV within the pH value of $7.5-9.0$ was recorded. A refractive index range of $0.65-1.25$ was observed. The XRD patterns show that the synthesized films exhibit large grain size and polycrystalline and cubic crystal structure. The SEM image exhibits a densely packed uniformed smooth surface of distribution of spherical-shaped grains, which covered the entire substrate. The spherical-shaped-like grains coalesce to form bigger particles with triangular-shaped rough surfaces at a higher value of pH. The film thicknesses were found to decrease from 105.55 nm to 100.98 nm as the pH increased from 7.5 to 9.0 .

کلمات کلیدی:

Energy bandgap, Zr/PbSe, Electrodeposition, Nanocrystal films, EDX, SEM, XRD

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