SYNTHESIS AND CHARACTERIZATION OF ZNS THIN FILMS DEPOSITED BY PLD AT DIFFERENT PRESSURES

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Thin zinc sulfide (ZnS) films are successfully deposited on glass and silicon substrates using pulsed laser deposition (PLD) at room temperature under different pressures of argon gas (0.1, 1, 10, 50 and 100 mTorr) and 200 °C at 10 mTorr pressure. For depositions was used a ZnS target with a purity of 99.99%, argon gas was used in general chamber at PLD. Argon influence on optical, structural and morphological properties thin films of zinc sulphide were investigated. Thin films were characterized by SEM, AFM, XRD, Raman and UV-Vis. SEM showed us the thickness of 100 nm, and the microstructural morphology was obtained, in which grain distribution on the substrate for film formation is seen. AFM showed us roughness difference between thin films deposited at room temperature and using 200 °C temperature. The Raman vibrational modes corresponding to ZnS a displacement of 300 cm⁻¹ and a characteristic vibrational mode of S to 60 cm⁻¹ they were shown. XRD results indicate that the films have an amorphous structure with small crystalline at room temperature, to the deposition made at 200 °C has a higher crystallinity. UV-Vis showed us the transmittance, absorbance and was possible to calculate bandgap to have the eV difference between all of them. In this study, the film deposited at a pressure of 10 mTorr to 200 °C is optimal for better crystallinity and better microstructural system and indicates that the PLD technique provides high purity films.

Keywords: Thin Film, PLD, ZnS

References:

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