Contribution ID: **159** Type: **Oral Presentation**

Deposition time-dependent properties of electrodeposited CdSe thin films from cadmium nitrate source for energy harvesting application.

Tuesday, 4 July 2023 11:40 (20 minutes)

Electrodeposition of CdSe thin films using a two-electrode configuration was performed at different deposition periods such as 5, 10, 15, 20, and 30 min on conductive glass substrate fluorine-doped tine oxide (FTO). Structural, optical, electrical, surface morphology, surface roughness, and elemental composition of CdSe thin films for both as-deposited and annealed samples were investigated by using X-ray diffraction (XRD), UV–VIS spectrophotometry, Photoelectrochemical cell analysis (PEC), scanning electron microscopy (SEM), scanning probe microscopy (SPM) and energy-dispersive X-ray spectroscopy (EDS) respectively. The structural properties show that CdSe thin films are found in cubic and hexagonal structures. Optical properties analysis shows that CdSe thin film absorbance increased with deposition time. The energy band gap varied between 1.69 and 1.85 eV for both as-deposited and annealed samples. PEC measurement confirmed that both as-deposited and annealed samples are n-type conductivity. The surface morphology analysis shows that the film covered the glass substrate, and the shape, grain size, and morphology changed with deposition time. The scanning roughness analysis confirmed that the average surface roughness was recorded as-deposited films 35.72, 53.61, and 45.45 nm for annealed samples 49.18, 55.26, 45.9 nm with deposition times 5, 20, and 30 min, respectively. The elemental composition analysis confirmed that both Cd and Se were present in the film, and their percentage composition varied with deposition time. In thin film solar cell devices, the thickness plays a great role and is controlled by deposition time. The CdSe film deposited at a short time of 5 min has potential application for the window (buffer) layer, and for a longer time, 30 min, is used as an absorber layer for solar cell devices.

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

yes

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

PhD

Primary author: Mr YIMAMU, Ahmed (UFS)

Co-authors: Prof. DEJENE, F.B (WSU); Dr ECHENDU , O.K (Federal University of Technology); Prof. TERBLANS, J.J (UFS); Prof. SWART, H.C (UFS); Dr MOTLOUNG1, S.J (UFS)

Presenter: Mr YIMAMU, Ahmed (UFS)

Session Classification: Physics of Condensed Matter and Materials Track 1

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