Title:	Substrate Evolution to Microstructural and Optoelectrical Properties of Evaporated CdS Thin Films Correlated with Elemental Composition
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Abstract:	A typical high-efficiency solar cell device needs the best lattice matching between different constituent layers to mitigate the open-circuit voltage loss. In the present work, the physical properties of CdS thin films are investigated where films with 100 nm thickness were fabricated on the different types of substrates viz. soda–lime glass, indium-doped tin oxide (ITO)- and fluorine-doped tin oxide (FTO)-coated glass substrates, and silicon wafer using electron beam evaporation. The X-ray diffraction patterns confirmed that deposited thin films showed cubic phase and had (111) as predominant orientation where the structural parameters were observed to be varied with nature of substrates. The ohmic behaviour of the CdS films was disclosed by current–voltage characteristics, whereas the scanning electron microscopy micrograph revealed the uniform deposition of the CdS films with the presence of round-shaped grains. The elemental analysis confirmed the CdS films deposition where the Cd/S weight percentage ratio was changed with nature of substrates. The direct energy band gap was observed in the 1.63–2.50 eV range for the films grown on different substrates. The investigated properties of thin CdS layers demonstrated that the selection of substrate (in terms of nature) during device fabrication plays a crucial role.
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