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THICKNESS EFFECT ON THE PHYSICOCHEMICAL PROPERTIES OF ELECTRODEPOSITED ZnTe LAYERS

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In this paper, we report the effect of different deposition durations on the physicochemical properties of electrodeposited ZnTe thin films. Varying thicknesses of the films were obtained at deposition durations of 0.25, 0.50, and 1.00 hours. ZnTe thin films were prepared from an aqueous electrolyte comprising 0.1 M $ZnSO_4.7H_2O$ as the Zn ion source and 10 ml of dissolved TeO_2 solution as the Te ion source. The physicochemical properties of the electroplated materials were investigated using selected analytical techniques relevant to this study. Properties such as optical, structural, compositional, morphological, and electrical were studied using UV–visible spectrophotometer, X-ray diffractometer, energy dispersive X-ray spectrometer, scanning electron microscope, and current-voltage (I – V) / capacitance-voltage (C – V) analyser respectively. The optical results revealed that the energy band gap of the thin films decreases as the deposition duration increases. The grain sizes and the crystallinity improved with increasing duration. The EDX analysis showed that the Te concentration decreases with increasing deposition duration while the Zn concentration moderately increases. The resistivity of the investigated thin films were within the range of accepted resistivity values for semiconductors, and they were found to be moderately doped based on the result from the C – V measurements. The study revealed that the variation in the deposition duration significantly influences the thin films' physicochemical properties. From the results, it can be concluded that the explored materials have the potential for optoelectronic applications.

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Keywords: Band gaps, Doping density, Electrodeposition, Resistivity, Thickness