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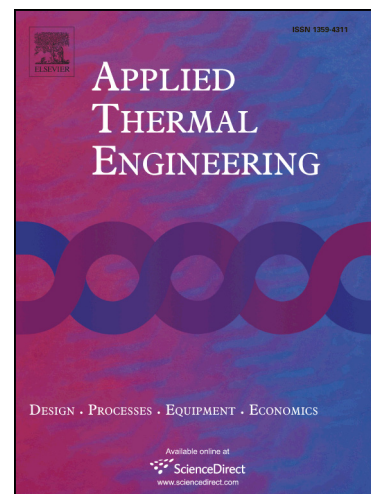
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Development and studies of $\text{Cd}_{1-x}\text{Mg}_x\text{Te}$ thin films with varying band gaps to understand the Mg incorporation and the related material properties

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Abstract:

In this paper we report a systematic work involving the development of $\text{Cd}_{1-x}\text{Mg}_x\text{Te}$ thin films by co-evaporation of CdTe and Mg. The evaporation rate of both materials were adjusted to obtain ternary films of varying stoichiometry and hence the band gap. We have deposited films with band gap ranging from 1.47 to 2.41 eV. The films were characterized for structural, morphological, optical, opto-electronic, and spectroscopic properties. The film stoichiometry was studied across the thickness using SIMS data. SEM images showed that the grain size has a dependence on Mg content in the film, which inhibits the grain growth. The structural parameters showed a systematic dependence on Mg content in the film, however, there was no noticeable change in the XRD reflections with respect that of pure CdTe for lower concentrations of Mg. XPS analysis shed light on the incorporation of Mg further supporting the band gap variations observed with the UV-Vis spectroscopic studies. The photoresponse of the film was affected by Mg incorporation. **Prototype devices of the type $\text{Cd}_{1-x}\text{Mg}_x\text{Te}/\text{CdS}$ were fabricated and the results are discussed.**

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