Title:	Toward CdCl2 activation on CdSe thin films for absorber layer applications
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Abstract:	The polycrystalline thin film solar cells often possess problem of grain boundaries which lower the efficiency of device, but several mechanisms/treatments are available to passivate these grain boundaries and enhance the performance of device concerned. In cadmium-based devices, the passivation could be undertaken by chloride activation where grain boundaries are passivated along with grain growth. In this report, the physical properties of the CdCl2-activated CdSe thin films are optimized. The CdSe thin films of thickness 550 nm are developed on microscopic glass and indium-doped tin oxide glass substrates employing electron beam evaporation technique followed by post-wet chloride treatment and subsequently annealing in air atmospheric condition at temperature of 170 °C, 320 °C and 470 °C. The structural analysis confirmed the polycrystalline nature with cubic phase of the CdSe films which changed into hexagonal at high temperature. The absorbance increases with the activation and optical energy band gap is found to decrease from 2.03 to 1.71 eV. The electrical analysis shows ohmic nature of the pristine and treated films. The surface morphology demonstrates grain growth with treatment, and the energy-dispersive spectroscopy (EDS) patterns indicate the existence of cadmium, selenium and chlorine elements which ensure deposition and chloride activation to the films. The outcomes designate that CdCl2-passivated CdSe films have appropriate candidature as an absorber layer to the solar cell device.
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