Title:	Towards CdZnTe solar cells: An evolution to post-treatment annealing atmosphere
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Abstract:	The increasing energy demand and resulting decay in the conventional energy resources indicate to find viable and affordable alternative resources. The cell efficiency and properties of absorber/window layers concerned can be tailored by the different post-treatments and therefore an evolution of post-treatment atmosphere conditions is undertaken in this work to enhance the performance of vapor proceed CdZnTe solar cells. Firstly, the microstructural and optical properties of absorber CdZnTe layer were optimized where films have zinc blende cubic structure with maximum crystallinity for Ar + O2 atmosphere while the energy band gap is influenced by the annealing in different atmospheres. Secondly, CdZnTe solar cells were fabricated using vapor proceed technique with device structure ITO/CdS/CdZnTe/Au and performance analysis is done by varying the atmosphere of post-annealing treatment. The device treated at 400 °C in the Ar + O2 atmosphere has maximum cell efficiency of 8.49% and more trap-states crossed the Fermi level as confirmed by Mott-Schottky plots. The dopant density and built-in potential are also evaluated. The findings of this work reveal that the efficiency of CdZnTe solar cells can be enhanced by the post-annealing treatment in different atmospheres.
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