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## Tunable visible light absorption of MoO<sub>3</sub>-CdTe composite thin films

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### Abstract

The development of a simple synthetic technique, based on thermal evaporation for tuning the band gap of molybdenum oxide (MoO<sub>3</sub>) thin films by doping with cadmium telluride (CdTe) is presented. The pure MoO<sub>3</sub> and CdTe films had amorphous and polycrystalline structures, respectively, and the addition of CdTe to MoO<sub>3</sub> did not show any influence on the structure of the doped films. The surface roughness of the films increased slightly with CdTe concentration. Depth profile analysis demonstrated a uniform distribution of the constituent elements along the depth of the films. Optical measurements confirmed that the films had significant enhancement in the absorption coefficient in the visible region as the concentration of CdTe increased. The optical band gap was reduced from 2.9 eV for pure MoO<sub>3</sub> films to 2.6 eV for the films doped with 10% CdTe. Photoelectrochemical characterization showed a steep increase in the photogenerated current densities of the CdTe-doped MoO<sub>3</sub> films due to the reduction of the band gap with CdTe concentration. Such doped films have potential applications in improving the photo-to-current conversion efficiency in solar cells.

**Keywords:** molybdenum oxide, cadmium telluride, thermal evaporation, band gap, photocurrent

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