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## Deposition, structure and properties of polyamide-CdSe-CdS composite material using sorption-diffusion method

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### Highlights

- We investigated deposition of a single phase mixed CdSe-CdS on polyamide.
- A single precursor -  $\text{K}_2\text{SeS}_2\text{O}_6$  – was used.
- XRD analysis showed hexagonal CdSe and orthorhombic CdS phases.
- Deposition mechanisms involved transient  $\text{H}_2\text{SO}_4$  formation.

### Abstract

Polyamide (PA) incorporated CdSe-CdS films were deposited using sorption-diffusion method. A single precursor -  $\text{K}_2\text{SeS}_2\text{O}_6$  – was used as both sulfur and selenium source. In aqueous solution,  $\text{SeS}_2\text{O}_6^{2-}$  diffused into the polymer where it reacted with  $\text{Cd}^{2+}$  ions to form cadmium chalcogenide particles. Crystallinity of the composite material was analyzed via XRD and both CdSe and CdS were detected within the material at all deposition conditions of temperature and  $\text{SeS}_2\text{O}_6^{2-}$  - chalcogenization - exposure time. A complex surface speciation was obtained using XPS analysis. Formation of the protonated amide species was observed in combination with the adsorbed  $\text{SO}_4^{2-}$  on the surface of the polymer confirming that  $\text{SeS}_2\text{O}_6^{2-}$  and its decomposition products hydrolyzed to form cadmium chalcogenides and  $\text{H}_2\text{SO}_4$ . A significant red shift in UV-Vis spectrum was observed with the increasing

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