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Abstract. Amorphous Cd-doped As_2Se_3 films with nominal Cd contents up to 12 at. % were prepared by thermal evaporation. Atomic force microscopy studies confirm the uniform film structure with surface roughnesses below 1 nm, independent of the Cd content. As shown by energy-dispersive X-ray spectroscopy, the Cd content in the film reveals a strong gradient and decreases with the film depth. For heavily Cd-doped (above 7 at. %) As_2Se_3 films, Raman features attributed to CdSe longitudinal optical (LO) phonon and its overtone (2LO) are revealed in the Raman spectra as an evidence for the formation of CdSe nanocrystallites in the As_2Se_3:Cd film under above-bandgap or below-bandgap laser illumination. The CdSe nanocrystallites undergo tensile strain due to a photoplastic effect in the As_2Se_3 film, *i. e.* partial removal of the material from the laser spot. The tensile strain value, estimated from the LO phonon frequency shift, is shown to reach nearly 2 GPa.