

## Supplementary material

### Composite formation in CdSe:Cu<sub>2</sub>Se nanocrystal films, charge transport characteristics and heterojunction performance

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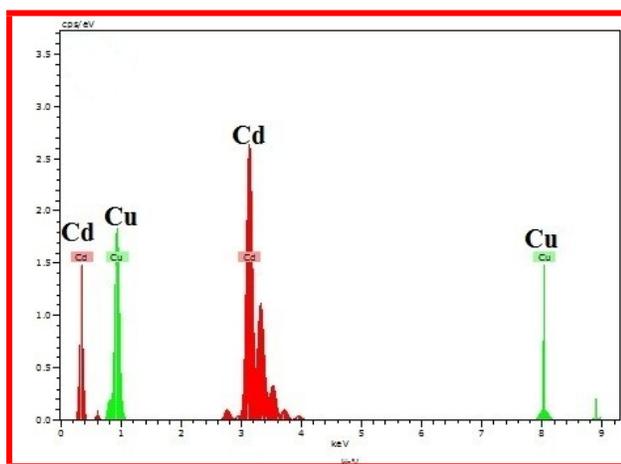


Fig. S1 EDS spectrum of CdSe:Cu<sub>2</sub>Se nanostructured thin film containing 10 wt% of Cu<sub>2</sub>Se.

Table S1. Atom% (at.%) of Cd and Cu in the CdSe:Cu<sub>2</sub>Se nanostructured films.

Element	CS5 (at.%)	CS10 (at.%)	CS20 (at.%)	CS30 (at.%)
Cd L	<b>96.13</b>	<b>90.76</b>	<b>82.28</b>	<b>70.14</b>
Cu K	<b>3.87</b>	<b>9.24</b>	<b>17.72</b>	<b>29.86</b>

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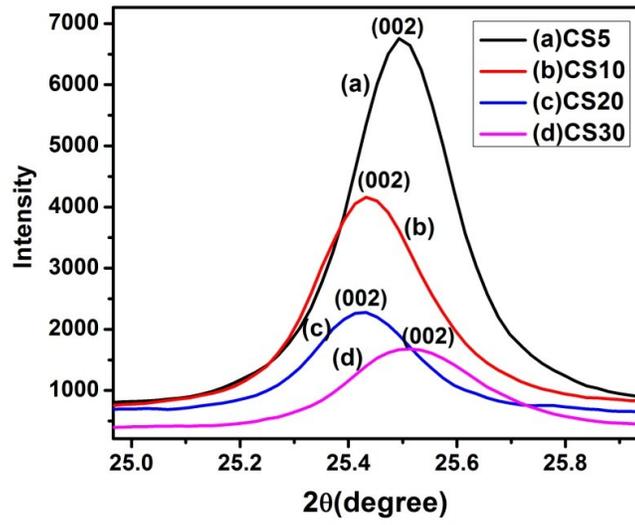


Fig. S2 XRD patterns showing enlarged (002) peaks of samples CS5, CS10, CS20, and CS30.

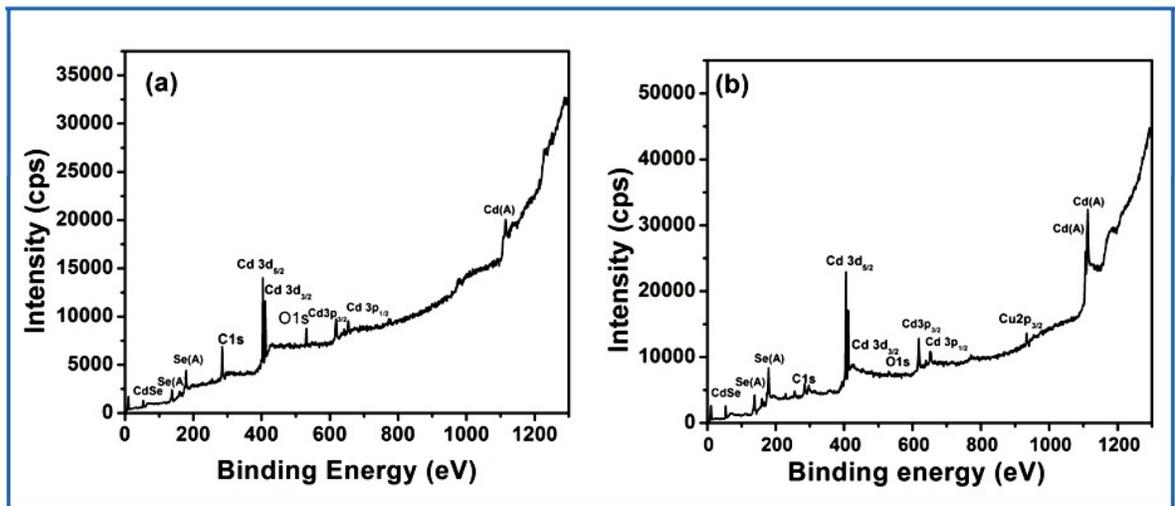


Fig. S3 XPS survey spectra of CdSe:Cu<sub>2</sub>Se nanostructured thin films: (a) sample CS5 and (b) sample CS20.

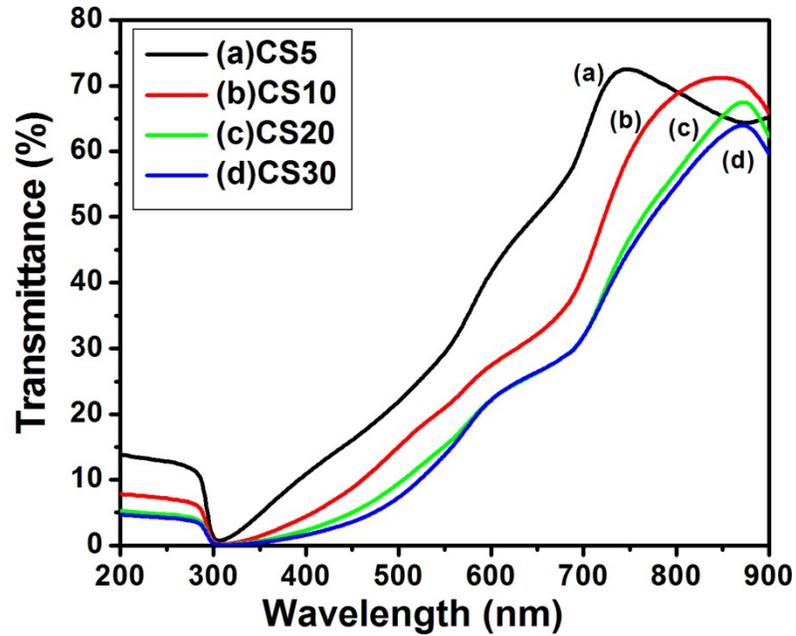


Fig. S4 Transmittance spectra of CdSe:Cu<sub>2</sub>Se nanostructured thin films: (a) sample CS5, (b) sample CS10, (c) sample CS20 and (d) sample CS30.

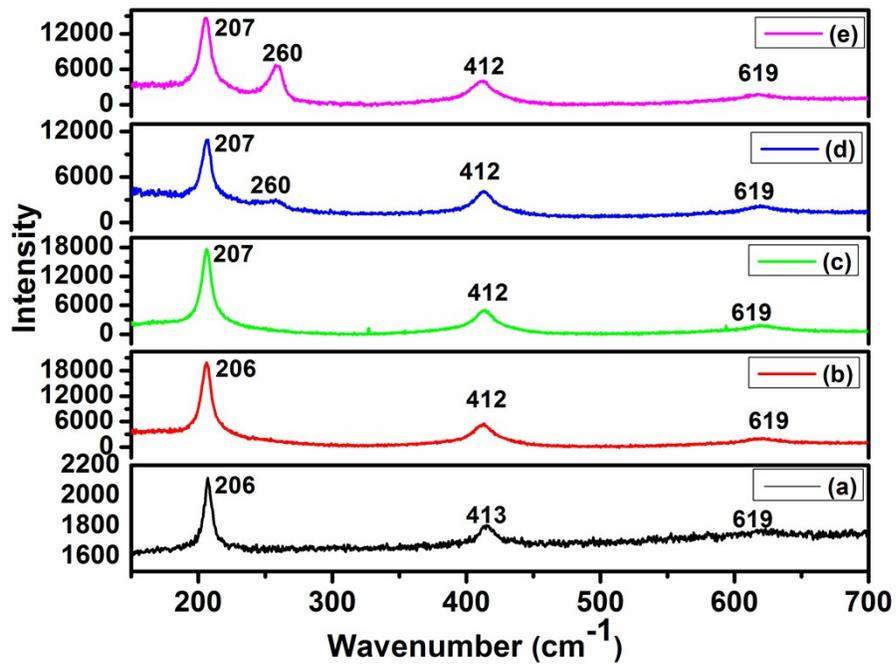


Fig. S5 Micro-Raman spectra of nanocrystal thin films of (a) pure CdSe, and of CdSe:Cu<sub>2</sub>Se containing different concentrations of Cu<sub>2</sub>Se : (b) CS5, (c) CS10, (d) CS20 and (e) CS30.

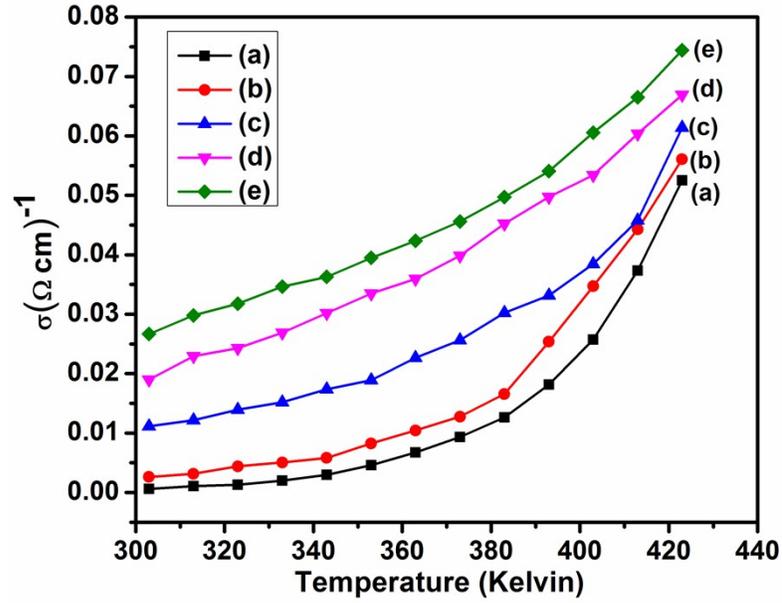


Fig. S6 DC electrical conductivity of nanocrystal thin films of (a) pure CdSe, and of CdSe:Cu<sub>2</sub>Se containing different concentrations of Cu<sub>2</sub>Se : (b) CS5, (c) CS10, (d) CS20 and (e) CS30.

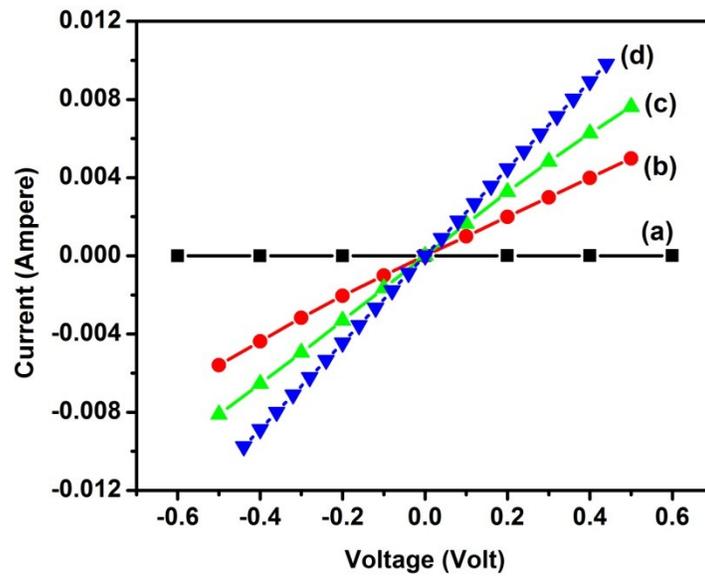


Fig. S7 Current–voltage characteristics of the heterojunction formed by nanostructured CdSe:Cu<sub>2</sub>Se films CS5, CS10, CS20 and CS30 deposited on ITO coated glass with a similarly deposited ITO-Cu<sub>2</sub>Se film.