

### CdSe and Zn-doped CdSe vertically aligned nanorod array films: Photoelectrochemical study

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In this work, closely arranged CdSe and Zn doped CdSe vertical nanorod array films were grown directly on FTO coated glass by using electro deposition method. Structural analysis by XRD showed the hexagonal phase without any precipitates related to Zn. Morphological analysis by FE-SEM showed end capped vertically aligned nanorods arranged closely. From the UV-Vis transmittance spectra, band gap energy was found to vary between 1.94 and 1.98 eV due to the incorporation of Zn. Photoluminescence spectra showed a narrow near band gap emission at 1.81 and 1.94 eV for CdSe and Zn doped CdSe. Solar cell parameters were obtained by assembling photoelectrochemical cells using CdSe and CdSe:Zn photoanodes, Pt cathode and polysulfide electrolyte. The efficiency was found to increase from 0.16 to 0.22 upon Zn doping. Electrochemical impedance spectra (EIS) indicate that the charge-transfer resistance on the FTO/CdSe/polysulfide interface was greater than on FTO/CdSe:Zn/polysulfide. Cyclic voltammetry results also indicate that the FTO/CdSe:Zn/polysulfide showed higher activity towards  $S_2^-/S_2^{2-}$  redox reaction than that of FTO/CdSe/polysulfide.