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Synthesis and Characterization of Cu Doped CdS for Photovoltaic Application

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Abstract—*Pristine and copper(Cu) doped (2.5%, 5% and 10%separately)cadmium sulphide (CdS) nanocomposites have been synthesized through chemical route. Structural and optical analysis of the prepared samples have been done through X-ray diffraction, UV-ViS and photoluminescence spectroscopy. The results from the X-Ray Diffraction clearly reveals its polycrystalline cubic zinc blende structure with the presence of three prominent planes (111), (220) and (311) (JCPDS 10-0454). The absorption spectra of all the samples show blue shift of their absorption edge which clearly signifies their quantum confinement. The bandgap of the samples obtained from tauc plot are 2.5eV, 2.19eV, 2.04eV and 1.8eV for pristine CdS, 2.5 % Cu doped CdS,5 % Cu doped CdS and 10% Cu doped CdS respectively. The decrease of bandgap with the increase of doping concentration is the usual behavior of doping process. The photoluminescence spectra shows near bandgap emissions at around 509nm for CdS which is red shifted to 540nm and 545nm for 2.5% and 10% Cu doped CdS respectively but for 5% Cu doped CdS it is blue shifted to 470nm along with an impurity emission around 620 nm. The PL intensity of CdS nanoparticles gradually decreases with the increase of doping concentration which indicates the reduction of the radiative recombination probability and thereby the carriers are likely to contribute to the conductivity. Thus the photoconductive property of the Cu doped CdS nanoparticles are greatly enhanced with the doping concentration in this range and thereby making this material suitable one for photovoltaic application.*