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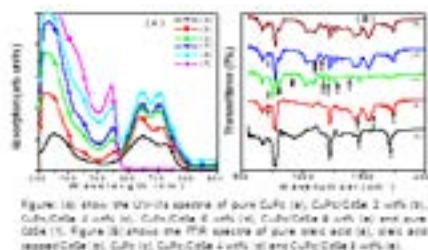
NANOSCIENCE AND MOLECULAR NANOTECHNOLOGY

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Investigation of doping of CdSe QDs in organic semiconductor for solar cell application

Ganesh R Bhand and N B Chaure
Savitribai Phule Pune University, India

Cadmium selenide (CdSe) quantum dots (QDs) were prepared by solvothermal route. Subsequently an inorganic QDs-organic semiconductor (copper phthalocyanine) nanocomposite (i.e CuPc:CdSe nanocomposites) were produced by different concentrations of QDs varied in CuPc. The nanocomposite thin films have been prepared by means of spin coating technique. The optical, structural and morphological properties of nanocomposite films have been investigated. The transmission electron microscopy (TEM) confirmed the formation of QDs having average size of 4 nm. The X-ray diffraction pattern exhibits cubic crystal structure of CdSe with reflection to (111), (220) and (311) at 25.4°, 42.2° and 49.6° respectively. The additional peak observed at lower angle at 6.9° in nanocomposite thin films are associated to CuPc. The field emission scanning electron microscopy (FESEM) observed that surface morphology varied with increasing concentration of CdSe QDs. The obtained nanocomposite show significant improvement in the thermal stability as compared to the pure CuPc indicated by thermo-gravimetric analysis (TGA) in thermograph. The effect in the Raman spectra of composite samples gives a confirm evidence of homogenous dispersion of CdSe in the CuPc matrix and their strong interaction between them to promote charge transfer property. The success of reaction between composite was confirmed by Fourier transform infrared spectroscopy (FTIR). The photo physical properties were studied using UV - visible spectroscopy. The enhancement of the optical absorption in visible region for nanocomposite layer was observed with increasing the concentration of CdSe in CuPc. This composite may obtain the maximized interface between QDs and polymer for efficient charge separation and enhance the charge transport. Such nanocomposite films for potential application in fabrication of hybrid solar cell with improved power conversion efficiency.



Biography

Ganesh R Bhand is a Senior Research Fellow (UGC-BSR) in the Department of Physics of Savitribai Phule Pune University, Pune (India). He is pursuing his PhD under the supervision of Dr. N B Chaure, Department of Physics, Savitribai Phule Pune University. He has completed his MPhil from the same university. His field of research is "Metal and semiconductor nanostructure for hybrid organic – inorganic solar cell". Presently, he is working on the synthesis and characterization of Au, Ag, CdSe, and CdTe nanostructures through wet chemical and solvothermal routes for solar cell applications.

grbhand@physics.unipune.ac.in

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