

## Quantum confinement effect in optical properties of CdSe quantum dots

Rakesh K. Mishra, A.G. Vedeshwar and R. P. Tandon

University of Delhi, India

The controlled diffusion growth process is employed for synthesis of CdSe quantum dots in borosilicate glass matrix. A systematic variation of glass constituent oxides further helps to set a proper host glass composition that supports the nucleation and growth of CdSe quantum dots. The dot sizes and their distributions were modified by heat treatment of glass samples in the temperature range from 500 °C to 800 °C for 15 minutes to 40 hours. Structural analysis by X-ray diffraction and transmission electron microscopy depict that the dots have average diameters between 2 and 10 nm. The exciton Bohr radius for CdSe is 5.6 nm, so these quantum dots provide the regime of strong quantum confinement. A blue shift was observed in optical absorption edge. The optical absorption spectra show that band gap of CdSe quantum dots ranges from 1.7eV to 2.9eV which confirms the strong confinement of quantum dots. The red shift of emission wavelength was observed in photoluminescence spectra as the thermal treatment time and temperature increased which justifies the viscosity dependence on cluster size.

### Biography

Rakesh Kumar Mishra has completed his Masters from University of Rajasthan, Jaipur, India with first division. He is currently a Ph.D. student at University of Delhi and his research interest is semiconductor quantum dot. He has published 4 research papers in international journals and proceeding. He presented his work as oral and poster presentation in many international and national conferences.

[mishrarake@gmail.com](mailto:mishrarake@gmail.com)