

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Probing defects in ZnO nanostructures by Photoluminescence and Positron Annihilation Spectroscopy¹ MANORANJAN GHOSH, A.K. RAYCHAUDHURI, S.N. Bose National Centre for Basic Sciences, S.K. CHAUDHURI, DIPANKAR DAS, UGC-DAE Consortium for Research — We have investigated defect related emission in the blue green region (2.2 eV – 2.5 eV) of ZnO nanostructures having spherical (5 nm-15 nm) as well as those with hexagonal platelet and rod like morphologies (20nm-100 nm), synthesized by solvo-thermal route. This emission show anomalous size dependence. Emission energy near 2.2 eV, shifts to higher energy (2.5 eV) for increase in size beyond 20nm when shape of the nanostructures changes. This change in photoluminescence has a close correlation with the size (and shape) induced change in the positron trapping rate which is directly proportional to the defect concentration. The trapping rates show non-monotonous dependence on size. It increases initially as the size increases (5nm-15nm) and then decreases as the size increases beyond 20nm. While increase of the trapping rate on size reduction is expected due to accumulation of more defects at the surface, the initial dependence of the trapping rate on the size (below 20nm) is anomalous. The data are explained by the presence of defects like Zn vacancy and confinement due to size reduction.

¹DST Unit for Nanoscience

Manoranjan Ghosh
S.N. Bose National Centre for Basic Sciences, Kolkata-98, INDIA

Date submitted: 20 Nov 2007

Electronic form version 1.4