Cu COMPLEX RELATED EMISSION IN ZnO Cu NANOCRYSTALS PREPARED BY ELECTROCHEMICAL METHOD

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Photoluminescence, X-ray diffraction, Scanning electron microscopy and Raman scattering have been used for the optical and structural characterization of ZnO and ZnO Cu nanocrystals (NCs) of various sizes. The samples prepared by an electrochemical method have a size from the range of 60 to 600 nm after a heat treatment for 2 hours at 400 °C in ambient air. X-ray diffraction diagrams present a small shift of peaks that testifies on a change in the lattice parameters of NCs with decreasing the NC size. The Raman scattering technique presents the several active modes including the surface phonon mode. The Raman intensity increases with decreasing the NC size is attributed to the surface enhanced Raman scattering (SERS) effect in ZnO Cu NCs. Photoluminescence spectra show a free exciton and defect-related emission. The peculiarities of defect related luminescence have been studied by means of the variation of temperatures and excitation light densities for the ZnO and ZnO Cu nanocrystals (NCs) of various sizes. The intensity stimulation of exciton-related PL bands with NC size decreasing up to 60 nm is attributed to the realization of the week confinement and the exciton-light coupling with the formation of polariton in small size ZnO NCs.

Keywords: Photoluminescence, X-ray diffraction, NANOCRYSTALS

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