Mn-doped ZnO nanocrystals synthesized by sonochemical method: Structural, photoluminescence, and magnetic properties


Abstract:

This work reports the synthesis of Mn-doped ZnO nanostructures using ice-bath assisted sonochemical technique. The impact of Mn-doping on structural, morphological, optical, and magnetic properties of ZnO nanostructures is studied. The morphological study shows that the lower doped samples possess mixtures of nanosheets and nanorods while the increase in Mn content leads to improvement of an anisotropic growth in a preferable orientation to form well-defined edge rods at Mn content of 0.04. UV–vis absorption spectra show that the exciton peak in the UV region is blue shifted due to Mn incorporation into the ZnO lattice. Doping ZnO with Mn ions leads to a reduction in the PL intensity due to a creation of more non-radiative recombination centers. The magnetic measurements show that the Mn-doped ZnO nanostructures exhibit ferromagnetic ordering at room temperature, as well as variation of the Mn content can significantly affect the ferromagnetic behavior of the samples.

Keywords:

ZnO nanostructures Sonochemical method Optical Photoluminescence Magnetic properties

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