

Dielectric relaxations and optical properties of Mn-doped ZnO nanoparticles, J. Mater Sci: Mater. Electron

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Abstract

Nanoparticles (NPs) of pure zinc oxide (ZnO) and $Zn_{1-x}Mn_xO$, where $x = 0.01$

and 0.05, were prepared using the co-precipitation method. The X-ray diffraction patterns revealed that both pure ZnO and Mn-doped ZnO NPs crystallize in hexagonal wurtzite. Different structure parameters are given. Other characterizations, such as scanning electron microscopy, energy-dispersive X-ray spectroscopy, and FTIR, were used to test the studied samples. The dielectric and optical properties were performed and discussed in detail. It was found that the dielectric permittivity and the ac conductivity of pure ZnO NPs increased significantly when the Mn ions substituted the Zn ones. A small polaron hopping conduction mechanism is suggested for the investigated samples. Different optical parameters were calculated in this work. The outcome results are discussed and compared to similar materials.