Magnetic properties of ZnO nanocrystals incorporating Co

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9.7 cm

Among the various oxide-based diluted magnetic semiconductors, transition metal doped ZnO has been the centre of interest, particularly at the nanoparticle scale. The aim of the present work was to study the magnetic properties of ZnO doped CoO (up to 50 wt. %) nanocrystalline samples prepared by two methods of synthesis. We used the microwave assisted hydrothermal synthesis and traditional wet chemistry method followed by calcination. The detailed structural characterization was performed by means of X-ray diffraction, micro-Raman spectroscopy measurements, scanning electron microscopy measurements and specific surface area measurements. For calcination method the crystalline phases of hexagonal ZnO and cubic Co_3O_4 were identified, for hydrothermal process hexagonal ZnO and cubic $ZnCo_2O_4$ phases were observed. The systematic measurements of AC magnetic susceptibility up to 180K and magnetization as a function of magnetic field (up to 9T) and temperature were performed. All samples demonstrate Curie-Weiss behavior at higher temperatures. For calcination process the increase of determined Curie-Weiss temperature with content of magnetic dopant is observed, for hydrothermal process the opposite effect is visible. We observe also differences in magnetization data for two methods of synthesis. The observed disparity in magnetic behavior for two synthesis methods will be discussed.

13.4 cm

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