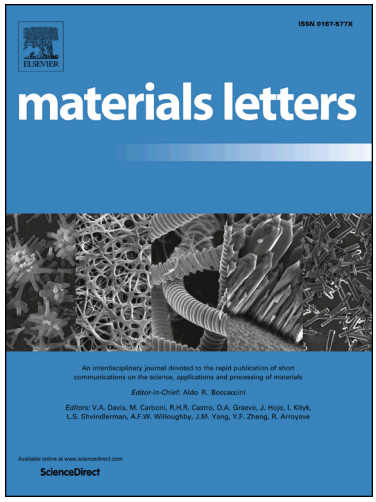

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Effects of temperature and atomic disorder on the magnetic phase transitions in ZnO nanoparticles obtained by sol gel method

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Abstract

In this work, we have studied the effects of temperature and atomic disorder on the magnetic phase transitions in ZnO nanoparticles obtained by sol gel method. The samples were sintered at temperatures of 600°C, 800°C 1000°C and 1200°C for 2 hours. The X-ray diffraction (XRD) analysis have shown a single phase, belonging to the hexagonal structure of ZnO and the Rietveld refinement showed an increase in the lattice parameters *a* and *c* with increasing sintering temperature. The crystallite mean size (*D*) increases from 61 nm to 70 nm, while the lattices strain decreases from 0.181% to 0.169% when the sintering temperature varies from 600°C to 1200°C. The magnetic measurements at 300K, exhibit a ferromagnetic contribution in combination with a paramagnetic component for samples obtained at 600°C, 800°C and 1000°C. A magnetic transition was verified for the sample obtained at 1200°C, now with diamagnetic behavior. The sol-gel method is presented as an alternative to study the evolution of the different magnetic phases as a function of the degree of atomic disorder in ZnO nanoparticles

Keywords: ZnO; atomic disorder; Rietveld refinement; sol-gel; magnetic properties.

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