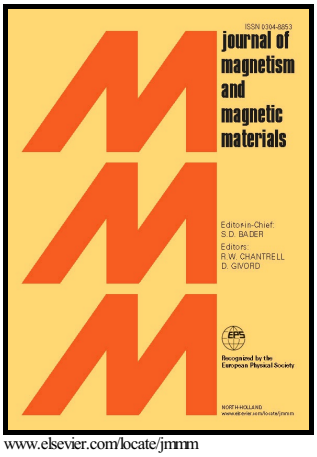

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Should the mass of a nanoferrite sample prepared by autocombustion method be considered as a realistic preparation parameter?

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Abstract

Detectable variations in structural, elastic and magnetic properties have been reported depending on the mass of the cobalt nanoferrite sample prepared by citrate autocombustion method. Heat released during the autocombustion process and its duration are directly proportional to the mass to be prepared, and is thus expected to affect both the crystallite size and the cation distribution giving rise to the reported variations in microstrain, magnetization, and coercivity. Formation of a pure spinel phase has been validated using X-ray diffraction patterns (XRD) and Fourier-transform infrared (FTIR) spectra. Crystallite sizes obtained from Williamson-Hall (W-H) method range from 28 to 87 nm, being further supported by images of high-resolution transmission electron microscope (HRTEM). Saturation magnetization and coercivity deduced from *M-H* hysteresis loops show a clear correlation with the cation distribution, which was proposed on the basis of experimentally obtained data of XRD, VSM, and IR. Elastic parameters have been estimated using the cation distribution and FTIR data, with a resulting trend quite opposite to that of the lattice parameter.

Keywords: nanostructures; autocombustion; X-ray diffraction; FTIR; magnetic properties