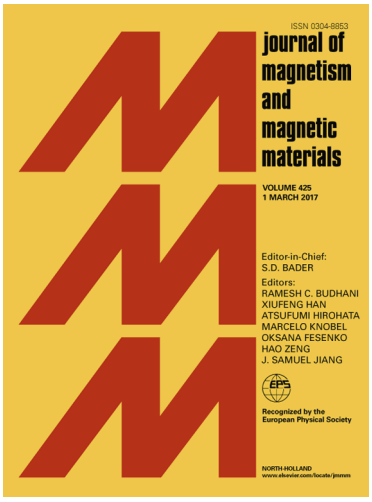

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Effect of sintering temperature on structural, magnetic, magnetocaloric and critical behaviors of Ni-Cd-Zn ferrites prepared using sol-gel method

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Abstract

We have investigated the effect of sintering temperature on structural, magnetic, magnetocaloric and critical behaviors of $Ni_{0.4}Cd_{0.3}Zn_{0.3}Fe_2O_4$ ferrites synthesized using sol-gel method at 900 °C and 1100 °C. X-ray diffraction patterns indicated that samples crystallize in the cubic spinel structure ($Fd\bar{3}m$ space group) with an increase of lattice constant and average crystallite size as the sintering temperature increases. Magnetic measurements revealed that that the prepared samples undergo second-order ferromagnetic (FM) to paramagnetic (PM) phase transitions. An increment in magnetization, Curie temperature, magnetic entropy change and relative cooling power has been observed with increasing the sintering temperature. The magnetic entropy change reached maximum values of about 1.11 $J.Kg^{-1}.K^{-1}$ and 1.62 $J.Kg^{-1}.K^{-1}$ for $\mu_0 H$= 5 T corresponding to relative cooling power (RCP) of 152.09 $J.Kg^{-1}$ and 253.65 $J.Kg^{-1}$ for samples sintered at 900 °C and 1100 °C, respectively. These values are comparable favorably with those of some others ferrites considered as possible candidates for magnetic refrigeration. The estimated critical exponents