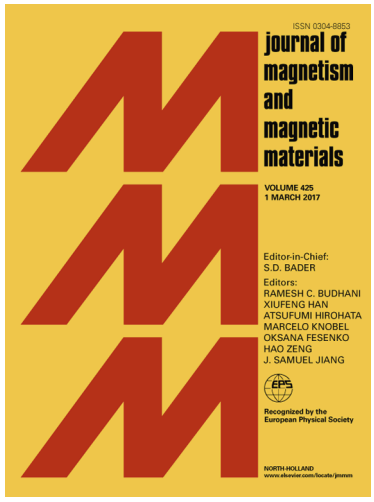

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Magnetic properties of Zn-substituted Y-type hexaferrites, $Ba_2Zn_xFe_{2-x}Fe_{12}O_{22}$

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Abstract— We report the magnetic properties of Zn-substituted barium Y-type hexaferrites with the Zn substituent, x, ranging from 0.5 to 2.0 in $Ba_2Zn_xFe_{2-x}Fe_{12}O_{22}$. After high-temperature annealing and subsequent furnace-cooling, single-phase samples with x = 0.5, 1.0, 1.5 could be successfully prepared in a reduced oxygen atmosphere ($PO_2 = 10^{-3}$ atm) while the single-phase was obtainable only from the sample with x = 2.0 in air. With increasing x from 0.5 to 2.0, both a lattice parameters (≈ 0.32%) and unit cell volumes (V_{cell}) (≈ 0.51%) were linearly increased but c lattice parameters (≈ 0.12%) were linearly decreased, which is in good agreement with the Vegard's law, indirectly supporting a successful formation of $Ba_2Zn_xFe_{2-x}Fe_{12}O_{22}$-type solid solutions. The saturation magnetization (M_s) was first increased with increasing x from 0.5 to 1.0 and then decreased up to x = 2.0. Thus, the highest M_s value of 44.7 emu/g was obtainable from the sample of x = 1.0 sintered at 1300˚C for 2 h in the low PO_2 of 10^{-3} atm. These results are attributable to the site preference of Zn^{2+} ions for the tetrahedral sites of Y-type hexaferrites.

Keywords: Y-type hexaferrite, low oxygen pressure, partial substitution of Zn^{2+}, magnetic properties