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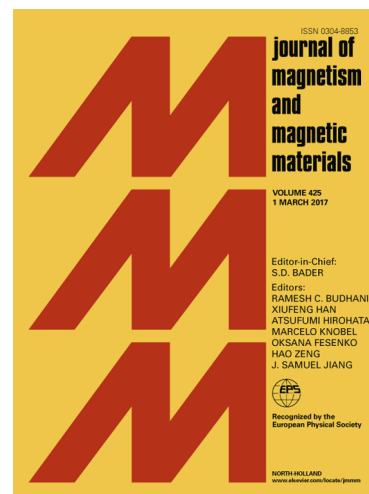
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# Magnetic properties of Zn-substituted Y-type hexaferrites, $\text{Ba}_2\text{Zn}_x\text{Fe}_{2-x}\text{Fe}_{12}\text{O}_{22}$

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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  $\text{Ba}_2\text{Zn}_x\text{Fe}_{2-x}\text{Fe}_{12}\text{O}_{22}$ . 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 ( $\approx 0.32\%$ ) and unit cell volumes ( $V_{cell}$ ) ( $\approx 0.51\%$ ) were linearly increased but  $c$  lattice parameters ( $\approx 0.12\%$ ) were linearly decreased, which is in good agreement with the Vegard's law, indirectly supporting a successful formation of  $\text{Ba}_2\text{Zn}_x\text{Fe}_{2-x}\text{Fe}_{12}\text{O}_{22}$ -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  $1300^\circ\text{C}$  for 2 h in the low  $PO_2$  of  $10^{-3}$  atm. These results are attributable to the site preference of  $\text{Zn}^{2+}$  ions for the tetrahedral sites of Y-type hexaferrites.

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

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