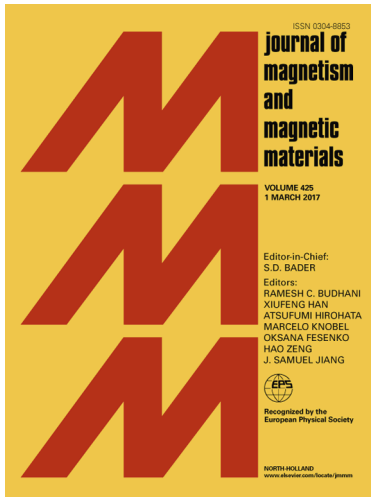

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Synthesis and properties of barium ferrite nano-powders by chemical co-precipitation method

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Abstract: Nano-powders with controllable particle size, excellent magnetic properties and thermal stability of barium hexaferrite ($BaFe_{12}O_{19}$) have been synthesized via a co-precipitation/calcination technique. The phase composition, morphology and magnetic/thermal properties of the products were systematically studied. XRD patterns reveal that a long co-precipitation reaction time (5 h) and high calcination temperature (1100°C) are beneficial for the formation of $BaFe_{12}O_{19}$ phase and decreasing the tendency to agglomeration. SEM micrographs show that the products show a hexagonal flake-like particle shape and the size are well controlled and maintained at single-domain particle size range area(<460nm), above which the coercivity will decrease abruptly for the coupling exchange among particles. The products with ${}_jH_c$ of 5934 Oe, temperature coefficient of remanence (α_{Br}) of -0.176% K^{-1} and temperature coefficient of coercivity (β_{jHc}) of 0.0427% K^{-1} were obtained when co-precipitated for 5 h and calcined at 900°C for 2h. A high saturation magnetization of 66.9 emu/g was obtained when co-precipitated for 5 h and calcined at 1100°C for 2 h, approaching the theoretical saturation magnetization (72 emu/g).

Key words: Nano-powders; Barium hexaferrite; Co-precipitation; Calcination; Single-domain particle

1. Introduction

Barium hexaferrite, $BaFe_{12}O_{19}$, is a well-known permanent magnet with great technical importance and it has attracted an extensive attention for the last few decades. $BaFe_{12}O_{19}$ compound has a hexagonal structure with fairly large crystal anisotropy along c-axis. As a result, Ba ferrite has shown high intrinsic

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