Magnetic Domain Structures and Magnetic Properties of Lightly Nd-Doped Sm?Co Magnets With High Squareness and High Heat Resistance

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Abstract

The relationship between magnetic domain structures and magnetic properties of Nd-doped Sm(Fe, Cu, Zr, Co)7.5 was investigated. In the preparation process, slow cooling between sintering and solution treatment was employed to promote homogenization of microstructures. The developed magnet achieved a maximum energy product, [BH]m, of 33.8 MGOe and coercivity, Hcb, of 11.2 kOe at 25 degC, respectively. Moreover, B-H line at 150 degC was linear, which means that irreversible demagnetization does not occur even at 150 degC. Temperature coefficients of remanent magnetic flux density, Br, and intrinsic coercivity, Hcj, were 0.035%/K and 0.24%/K, respectively, as usual the conventional Sm-Co magnet. Magnetic domain structures were observed with a Kerr effect microscope with a magnetic field applied from 0 to -20 kOe, and then reverse magnetic domains were generated evenly from grain boundaries. Microstructures referred to as "cell structures" were observed with a scanning transmission electron microscope. Fe and Cu were separated to 2-17 and 1-5 phases, respectively. Moreover, without producing impurity phases, Nd showed the same composition behavior with Sm in a cell structure.

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