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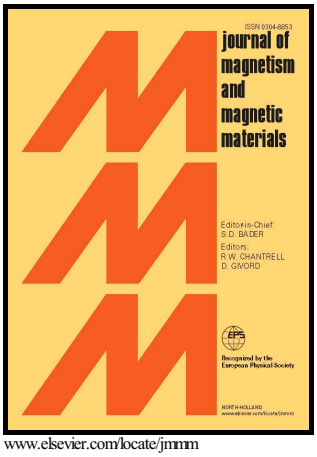

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Influence of annealing temperature on the Dy diffusion process in NdFeB magnets

Sheng-qing Hu[a,*], Kun Peng[b, a*], Hong Chen[a]

[a] State Key Laboratory of Powder Metallurgy, Central South University, Changsha, 410083, China

[b] College of Materials Science and Engineering, Hunan University, Changsha, 410082, China

33203010@qq.com (Sheng-qing Hu)

kpeng@hnu.edu.cn (Kun Peng).

[*]Corresponding authors:

Abstract:

Sintered NdFeB magnets were coated with a layer of Dy metal using electron beam evaporation method and then annealed at various temperatures to investigate the temperature dependence of Dy diffusion process in NdFeB magnets. A Dy-rich phase was observed along the grain boundaries after the grain boundary diffusion process, the diffusion coefficients of various temperatures were obtained, the diffusion coefficients of Dy along the grain boundaries at 800°C and 900°C were determined to be $9.8\times10^{-8}cm^2\cdot s^{-1}$ and $2.4\times10^{-7}cm^2\cdot s^{-1}$, respectively. The diffusion length depended on the annealing temperature and the maximum diffusion length of approximately 1.8 mm and 3.0 mm can be obtained after annealing at 800°C and 900°C for 8h. Higher diffusion temperature results in the diffusion not only along the grain boundaries but also into grains and then decrease in magnetic properties. The optimum annealing conditions can be determined as 900°C for 8h. The coercivity was improved from 1040KA/m to 1450KA/m and its magnetization has no significant reduction after the grain boundary diffusion process at the optimum annealing conditions.

Keywords:

diffusion; grain boundary; magnetization; magnetic property

1. Introduction