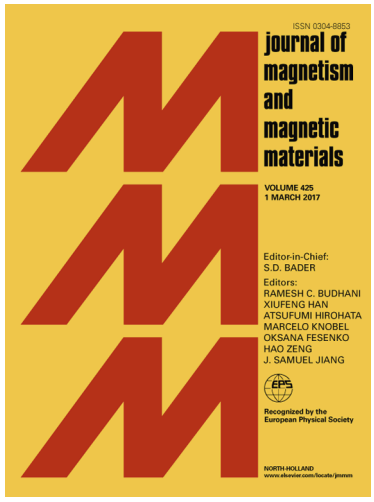

Boundary structure modification and coercivity enhancement of the Nd-Fe-B magnets with TbCu doping by the process of pre-sintering and hot-pressing

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Boundary structure modification and coercivity enhancement of the Nd-Fe-B magnets with TbCu doping by the process of pre-sintering and hot-pressing

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Abstract: The high-coercivity Nd-Fe-B magnets with "core-shell" structure grains were prepared by doping TbCu powders and hot pressing after pre-sintering in the traditional powder metallurgy process. The coercivity for the hot-pressed pretreated Nd-Fe-B magnet is obviously enhanced to 28.6 kOe from 24.3 kOe by TbCu alloy doping. The Tb contents at the shell structure of grain in the hot-pressed pretreated magnet is 5.7 wt.% while that in the dual-alloy magnet is 3.0 wt.%. The enrichment of Tb elements in the shell layer further enhances the anisotropy of the grain surface and effectively improves the utilization efficiency of heavy rare earths. The existence of the hard $(Tb, Nd)_2Fe_{14}B$ shell， which can effectively inhibit the reverse nucleation of magnetic domains, contribute to enhance the coercivity with few reduction of the remanence. Compared with the grain boundary diffusion process, this technology can be used to prepare large pieces of high performance Nd-Fe-B bulk magnets without diffusion depth limit.

Keyword: Nd-Fe-B sintered magnets; Microstructure; Intergranular additive; Element distribution; Diffusion.