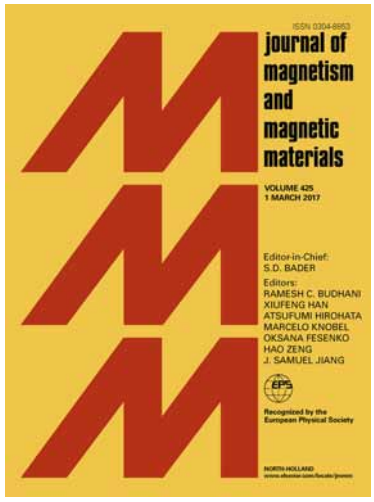

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Abstract:
We have attempted to fabricate a nanocomposite Nd-Fe-Ti-B magnet. Flash-lamp rapid annealing treatments were performed for melt-spun ribbons to obtain the α-Fe/$Nd_2Fe_{14}B$ composite microstructure, and the evolution of magnetic properties by the annealing was studied by vibration sample magnetometer (VSM). It was found that the magnetic properties were improved by relatively short-time annealing at the temperatures near the crystallization temperature. Further higher-temperature and longer annealing treatments resulted in deterioration of the magnetic properties. For the selected samples, recoil curves were measured to analyze the spring-back behaviors. Transmission electron microscopy (TEM) was performed to investigate the microstructural factors for the deterioration of the magnetic properties. The relation between the variation of the magnetic properties (coercivity, saturation magnetization and recoil permeability) and the microstructural factors were discussed.

Keywords:
Nanocomposite magnet, exchange coupling magnet, recoil permeability, TEM, spring back.

1. Introduction

A nanocomposite magnet (also referred to as an exchange spring magnet) that consist of soft magnetic phase (e.g. α-Fe, FeCo, and so on) and hard magnetic phase (e.g. $Nd_2Fe_{14}B$ = $Nd_{12}Fe_{82}B_6$) is a promising candidate for a next generation permanent