EFFECT OF LOW-TEMPERATURE ANNEALING ON THE STRUCTURE AND HYSTERETIC PROPERTIES OF ND-FE-B MAGNETS PREPARED WITH HYDRIDE-CONTAINING POWDER MIXTURES

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Abstract

The effect of low-temperature treatment on the structure and hysteretic properties of Nd-Fe-B magnets, which were prepared using strip-casting alloy (wt%) Nd -24%, Pr – 6.5%, Dy – 0.5%, B – 1 %, Al – 0.2%, Fe – balance and 2 wt % DyH2 addition, has been studied. Hysteretic properties of the magnets subjected to the optimum heat treatment are Br = 1.29 T, jHc = 1309 kA/m, Hk = 1220 kA/m, (BH)max = 322 kJ/m3. The subsequent combined heat treatment at 250 to 500oC (for 20 h) does not change the hysteretic properties. The degradation of magnetic properties (decrease in jHc and Hk to 1105 and 960 kA/m, respectively) is observed only after the repeated annealing at 550oC. The hysteretic properties of the magnets can be restored completely by heat treatment 1050oC (1 h) + 500oC (2 h). The data obtained demonstrate the higher thermal stability of hysteretic properties of magnets prepared from hydride-containing powder mixtures. The observed effect is attributed to the formation of a non-uniform Dy distribution in (Nd, Pr, Dy)2Fe14B principal magnetic phase grains.

Keywords: Nd-Fe-B-based magnets, coercivity, dysprosium hydride, low-temperature annealing

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