Abstract

- A study on magnetic properties of permanent magnet Nd-Fe-(Ti, B, Mo)-N alloys -

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Tetragonal $ThMn_{12}$-type Nd-Fe-(Ti, B, Mo)-N alloys have been studied with X-ray diffraction, Mössbauer spectroscopy and vibrating sample magnetometer(VSM). Nd-Fe-(Ti, B, Mo)-N alloys were prepared by an arc-melting method under an argon gas atmosphere(DAIA ACM-01). Nitrogenation had been performed by annealing the alloy powders in a pure N_2 flow at 500 ℃ for 15 min. The crystal structure of Nd-Fe-(Ti, B, Mo)-N alloys was found to be a tetragonal structure with lattice constants (a_o=8.638 Å and c_o=4.819 Å).

Mössbauer spectroscopy measurements were performed at various temperatures ranging from 13 to 800 K and magnetic properties were measured 77 to 1000 K by using a VSM. Curie and Debye temperatures of $NdFe_{10.7}Ti_{1.3}$ were determined to be T_c=590 ± 5 K and Θ=374 ± 5 K,

respectively, and those of $NdFe_{10.7}Ti_{1.3}N_8$ are T_c=743 ± 5 K and Θ=501 ± 5 K. The result of Mössbauer spectrocopy measurements was clearly shown that nitrogenation enhanced Curie and Debye temperatures of Nd-Fe-(Ti, B, Mo)-N alloys remarkably. Mössbauer spectra of Nd-Fe-(Ti, B, Mo)-N alloys were fitted with six subspectra of Fe sites in the structures($8i_1$, $8i_2$, $8j_2$, $8j_1$,8f and α–Fe). Magnetic hyperfine fields for the Fe sites decreased in the order, $H_{hf}(8i) > H_{hf}(8j) > H_{hf}(8f)$.