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Mössbauer Studies of the N50 Permanent Magnet

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The crystal and the magnetic properties of the N50 permanent magnet, which is widely used in industrial applications, have been studied by using x-ray diffractometer (XRD), vibrating sample magnetometer (VSM), and Mössbauer spectrometer. The crystal structure was determined to be tetragonal with a Nd-Fe-B structure. Based on the M-T curves, the values of spin reorientation temperature (T_{SR}) and Curie temperature (T_C) were found to be 130 and 600 K, respectively. The Mössbauer spectra of N50 showed abrupt changes in the magnetic hyperfine field (H_{hf}) and the electric quadrupole shift (E_Q) at temperatures around 130 K, indicating a spin reorientation (T_{SR}). From the Mössbauer absorption area as a function of the square of the temperature for the N50 permanent magnet, the Debye temperature (Θ_D) was found to be $\Theta_D = 414.7$ K.

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