MFM STUDY OF Nd–Fe–B-BASED PERMANENT MAGNETS

Witold Szmaja,[a] Jarosław Grobelny,[b] and Michał Cichomski[b]

[a]Dept. of Solid State Physics, University of Łódź,
Pomorska 149/153, 90-236 Łódź, Poland

[b]Dept. of Chemical Technology and Environmental Protection, University of Łódź,
Pomorska 163, 90-236 Łódź, Poland

9.7 cm

Magnetic force microscopy (MFM) was used to observe the domain structures of anisotropic sintered Nd–Fe–B-based magnets and isotropic nanocomposite $Nd_2Fe_{14}B/Fe_3B$ magnets. The former magnets were in bulk form and consisted of grains with an average size of about 10 μm, while the latter magnets were in the form of ribbons about 40–50 μm thick and consisted of grains with an average size of about 30 nm. The magnets were studied in the thermally demagnetized state. In the case of the anisotropic sintered Nd–Fe–B-based magnets, studies made on the surface perpendicular to the alignment axis showed that the magnetic domain structure is composed of the main domains typically 1–2 μm wide, surface reverse spikes typically 0.5–1 μm in diameter and fine surface domains typically 50–200 nm wide. The presence of the surface domain structure reduces the magnetostatic energy near the specimen surface. In the case of the isotropic nanocomposite $Nd_2Fe_{14}B/Fe_3B$ magnets, the so-called interaction domains a few hundred nanometers in size were observed. These domains are found to be clusters composed of many grains with exchange interaction between the grains. Within the interaction domains a fine scale image contrast could be seen, indicating that the magnetization directions of individual grains are not precisely the same but differ slightly.

13.4 cm

Subject category :

6. Soft and Hard Magnetic Materials

Presentation mode :

poster

Corresponding author :

Witold Szmaja

Address for correspondence :

Department of Solid State Physics, University of Łódź
Pomorska 149/153, 90-236 Łódź, Poland

Email address :

szmaja@mvii.uni.lodz.pl