

IMAGING MAGNETIC MICROSTRUCTURES WITH THE USE OF ELECTRONS

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Magnetic domains can be observed by a number of methods, involving different physical principles of magnetic contrast formation. The subject of interest of the present paper is studying magnetic microstructures by some of the techniques which make use of electrons. In this context, we refer to the examples of magnetic microstructure images of cobalt monocrystals, Nd-Fe-B permanent magnet and a thin permalloy film, while the methods used are the type-I magnetic contrast technique of scanning electron microscopy (SEM), the colloid-SEM method and the Fresnel mode of transmission electron microscopy (TEM). It is shown that the SEM type-I magnetic contrast and the colloid-SEM method have quite different probing depths and consequently provide useful complementary information on the magnetic microstructure at the surface of bulk materials which exhibit an out-of-plane component of magnetization. Improved results were achieved with the colloid-SEM technique, both from the viewpoint of the spatial resolution and the quality of the original images obtained. It is demonstrated that TEM is a very valuable method for investigating the magnetic microstructure of thin magnetic films, mainly because of its high spatial resolution and high sensitivity to small variations in the magnetization.

9.7 cm

13.4 cm

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