

Magnetic study of nanocrystalline iron particles in alumina matrix

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Abstract: X-ray diffraction, Mossbauer effect and magnetisation investigations have been performed on sputtered $\text{Fe}_{40}(\text{Al}_2\text{O}_3)_{60}$ thin films. Ultrafine Fe particles of nanometer size in an amorphous Al_2O_3 matrix have been formed by annealing in the temperature range from 100°C to 500°C. Their particle sizes, however, show a rather wide distribution. Mossbauer spectra are constituted of both paramagnetic and ferromagnetic contributions. The paramagnetic contribution is associated with small grains of Fe, whereas the magnetic component is contributed by large iron grains. This assumption is supported by the ZFC- and FC-measurements, in which the "blocking" temperatures of 60 and 90 K were evidenced for as-deposited and 200°C-annealed films, respectively. © 2003 Elsevier Science B.V. All rights reserved.

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