

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Magnetite nanoparticles with almost bulk magnetic properties: the role of the surfactant XAVIER BATLLE, PABLO GUARDIA, OSCAR IGLESIAS, AMÍLCAR LABARTA, Universitat de Barcelona, ALEJANDRO G. ROCA, ICMMM-Madrid, M. PUERTO MORALES, CARLOS J. SERNA, ICMM-CSIC, INSTITUT DE NANOCIENCIA I NANOTECNOLOGIA, UNIVERSITAT BARCELONA TEAM, ICMM-CSIC TEAM — Uniform magnetite nanoparticles of 6, 10 and 17 nm were synthesised by thermal decomposition of an iron precursor. Oleic acid was used as surfactant. Saturation magnetization M_s reaches the expected value for bulk magnetite at low temperature, in contrast to results in small particle systems for which M_s is usually much smaller due to surface spin disorder. The coercive field for the 6 nm particles is also in agreement with that of bulk magnetite. Both results suggest that the oleic acid molecules covalently bonded to the nanoparticle surface yield a strong reduction in the surface spin disorder, such that the new O^{2-} surface ligands partially reconstruct the crystal field of the surface Fe cations, as suggested by XPS. This may be of relevance in biomedical applications to reduce the strength of the magnetic field required to obtain a high M_s and opens the question of whether M_s above the bulk value may be obtained by taking advantage of the orbital contribution. Work funded by Spanish NAN2004-08805-CO4-02 and NAN2004-08805-CO4-01, and CONSOLIDER CSD2006-12

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Date submitted: 05 Dec 2006

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