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Surface vacancy mediated pinning of the magnetisation in γ-Fe2O3 nanoparticles: A micromagnetic simulation study*

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Results from finite temperature stochastic LLG simulations of an atomistic core-shell model of γ-Fe_2O_3 spherical nanoparticles are presented. The radial surface anisotropy gives rise to a surface magnetisation with a Neel-like domain wall separating the magnetic poles. It is shown that the pinning of the domain wall by the oxygen anion sites plays an important role in the low temperature relaxation processes [1]. The core-shell model shows qualitative agreement with experimental results. A super-spin model with temperature-dependent anisotropy is a promising model to simulate complex hierarchical structures and the long time scale dynamics of such nanoparticles[2].

[1] T. N. Shendruk, R. D. Desautels, B. W. Southern, and J. van Lierop, Nanotechnology, vol. 18, p. 455704, 2007.

[2] M. A. Kostiainen, P. Ceci, M. Fornara, P. Hiekkataipale, O. Kasyutich, R. J. M. Nolte, J. J. L. M. Cornelissen, R. D. Desautels, and J. van Lierop, ACS Nano, vol. 5, pp. 6394–6402, 2011

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