Effects of coating spherical iron oxide nanoparticles

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Abstract

We investigate the effect of several coatings applied in biomedical applications to iron oxide nanoparticles on the size, structure and composition of the particles. The four structural techniques employed – TEM, DLS, VSM, SAXS and EXAFS – show no significant effects of the coatings on the spherical shape of the bare nanoparticles, the average sizes or the local order around the Fe atoms. The NPs coated with hydroxylmethylene bisphosphonate or catechol have a lower proportion of magnetite than the bare and citrated ones, raising the question whether the former are responsible for increasing the valence state of the oxide on the NP surfaces and lowering the overall proportion of magnetite in the particles. VSM measurements show that these two coatings lead to a slightly higher saturation magnetization than the citrate.