Synthesis of ellipsoidal iron oxide nanoparticles for biomedical applications

A. L. Drummond[1], A. C. C. Santana[1], M. J. A. Sales[1], M. H. Sousa[2], L. P. da Silva[3]
[1]*Universidade de Brasília, Campus Darcy Ribeiro, DF, Brazil*
[2]*Universidade de Brasília, Faculdade UnB Ceilândia, Brazil*
[3]*Empresa Brasileira de Pesquisa Agropecuária, Embrapa, Brazil*

The ability to control the nature, morphology, size and monodispersity in synthesizing magnetic nanoparticles is important for exploring their technological and biomedical applications. Iron oxides are commonly utilized with biomedical purposes because of their biocompatibility and relative lower toxicity in human body. Nevertheless, while the synthesis of spherical oxide nanoparticles has been extensively studied, the synthesis of anisometric iron oxide nanoparticles with controllable sizes and monodispersities is relatively limited. Anisometric particles when compared with isometric nanoparticles are likely to behave quite differently both magnetically and when interacting with biological entities. In this way, one proposes the synthesis of ellipsoidal magnetic iron oxides with controllable morphology, size and monodispersity. Nanostructures were synthesized by adaptation of the methodology described in ref [1], where the particle characteristics are modified by changing the nature and concentration of complexing agents during the synthesis in homogeneous media. This procedure yields oxide precursors which are oxidized to maghemite nanoparticles (γ-Fe_2O_3). XRD patterns revealed the crystalline structure while chemical analysis and FTIR spectra showed the nature of synthesized materials. The analyses of AFM images showed that particles obtained by the procedure described in this work (Figure 1b) are smaller than particles obtained by the original methodology (Figure 1a), being in nanometric scale and relatively monodisperse. (This work was supported by CNPq)

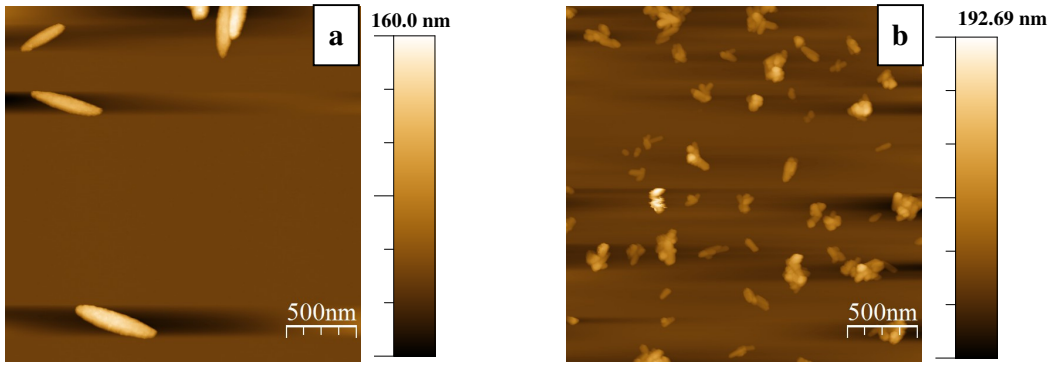

Figura 1. AFM images of iron oxide particles obtained by (a) original and (b) the new methodology.

Keywords: iron oxides, ellipsoidal nanoparticles, magnetic nanoparticles.

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adrildrummond@gmail.com
Universidade de Brasília, Instituto de Química. Asa Norte
CEP: 70910970 - Brasília, DF - Brazil - Caixa-Postal: 04478