Elucidating the morphological and structural evolution of iron oxide nanoparticles formed by sodium carbonate in aqueous medium

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Supporting information

Changes on crystal structure over time were studied by the ATR-FTIR spectra. The as-synthesized sample presented the characteristic goethite ν_{OH} stretch, δ_{OH} in plane bend and γ_{OH} out of plane bend bands, at 3140, 892 and 795 cm^{-1};[1] which were not present 24 h after the synthesis had been carried out (Figure S1) due to the evolution of the crystal structure over time. As the band observed around 3500 cm^{-1} for magnetite is also associated to coordinated OH groups from the physisorbed water on the nanoparticle surface[2, 3], it cannot be used for identification purposes.

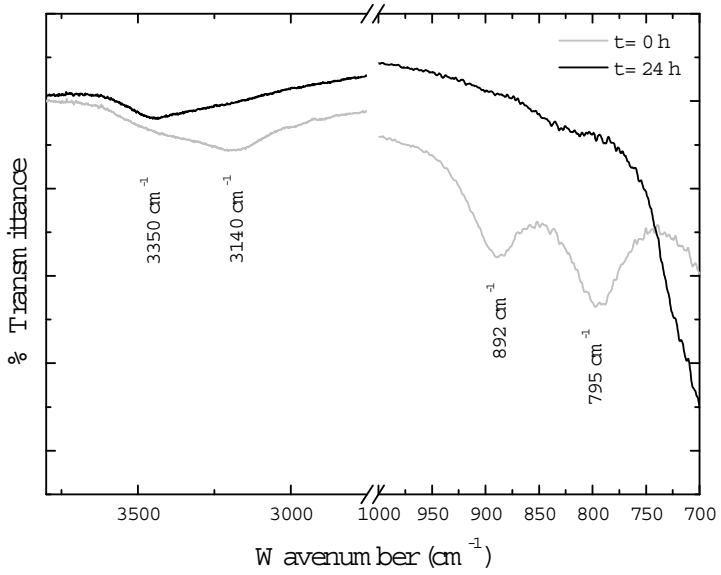

Figure S1. ATR-FTIR spectra of iron oxide nanoparticles prepared at RT at t = 0 and t = 24 h. The 2000 - 2800 cm^{-1} range has been excluded as no significant information was found.

Changes in the crystal structure of magnetite nanoparticles studied at pH 10 (Figure S2).

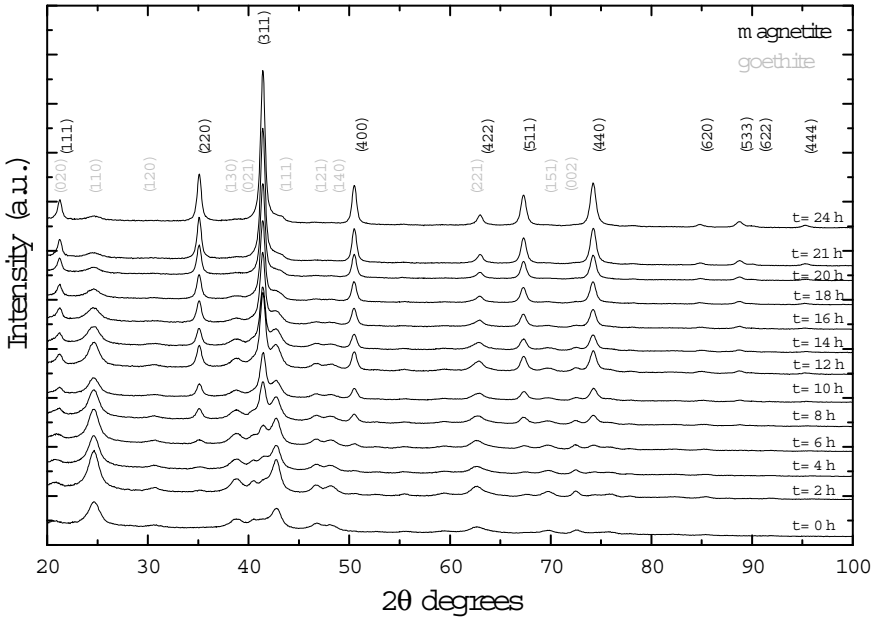

Figure S2. XRD pattern shift over 24 h for iron oxide nanoparticles synthesized at RT and pH 10. Diffraction patterns have been offset along the y axis for a better comparison.

References

1. Cambier, P., Infrared study of goethites of varying crystallinity and particle size; I, Interpretation of OH and lattice vibration frequencies. *Clay Minerals* **1986**, 21, 191-200.
2. Keiser, J. T.; Brown, C. W.; Heidersbach, R. H., The Electrochemical Reduction of Rust Films on Weathering Steel Surfaces. *Journal of The Electrochemical Society* **1982**, 129, 2686-2689.
3. Busca, G.; Lorenzelli, V.; Ramis, G.; Willey, R. J., Surface sites on spinel-type and corundum-type metal-oxide powders. *Langmuir* **1993**, 9, 1492-1499.