

Study of the instability of compound La-doped Fe₃O₄ by Perturbed Gamma-Gamma Angular Correlations

I. T. Matos¹, B. Bosch-Santos¹, G. A. Cabrera-Pasca¹, P. B. A. Fechine², A. W. Carbonari¹

¹*Instituto de Pesquisas Energéticas e Nucleares, IPEN-CNEN/SP, University of São Paulo, USP, Av. Prof. Lineu Prestes, 2242, São Paulo, SP, 05508-000, Brazil.*

²*Departamento de Química Analítica e Físico-Química, Universidade Federal do Ceará, UFC, Campus do Pici, CP 12100, Fortaleza, CE 60451-970, Brazil*

The integration of nanotechnology with molecular biology offers great advantages in biomedical applications. Some of these applications include "drug delivery", imaging, labeling and tracking cells using Fe₃O₄ nanoparticles. Doping with rare-earth element can enhance the properties of the particles for these applications, especially for imaging. In this work, doping of ferrite Fe₃O₄ nanoparticles, which present a cubic inverse spinel structure, with low concentrations (1% a 5%) of La were investigated by perturbed γ - γ angular correlation (PAC) spectroscopy using ¹¹¹In(¹¹¹Cd) as probe nuclei. The aim of the present experiments was to investigate the behavior of temperature dependence of the magnetic hyperfine field. It was, however, observed that samples oxidize at 200°C and undergo a structural change to Fe₂O₃ at above 600°C. The structure of samples was characterized by X-ray diffraction (XRD) and the results show that all samples crystallize in the expected structure.