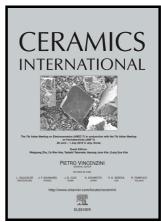
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ACCEPTED MANUSCRIPT

Gadolinium ferrite nanoparticles: Synthesis and morphological, structural and magnetic properties

N.C. Sena^{a, b}, T.J. Castro^{a, b}, V. K. Garg^a, A. C. Oliveira^a, P.C. Morais^{a,c}, S.W. da

Silva^{a,*},

^a Universidade de Brasília, Instituto de Física, Brasília DF 70919-970, Brazil.

^b Instituto Federal de Educação, Ciência e Tecnologia de Brasília, Brasília DF 70830-

450, Brazil.

^c College of Chemistry and Chemical Engineering, Anhui University, Hefei 230601,

China.

Abstract - In this study we report on the successful synthesis of Gd_xFe_{3-x}O₄

nanoparticles with nominal Gd-content (x) in the range $0.00 \le x \le 0.50$. The effect of the

nominal Gd-content on morphological, structural and magnetic properties was

investigated by transmission electron microscopy (TEM), X-ray diffraction (XRD),

Raman spectroscopy and Mössbauer spectroscopy. We found the actual inclusion of

Gd³⁺ ions into cubic ferrite structure lower than the nominal values, though no extra

phase was observed in the whole range of our investigation. Moreover, from Mössbauer

data we found evidences of Gd³⁺ ions replacing both Fe³⁺ and Fe²⁺ ions, the latter

leading to iron vacancies in the cubic ferrite crystal structure. As the nominal Gd-

content, the lattice parameter and the average crystallite size increases monotonically.

We found that in the same range of nominal Gd-content the lattice parameter decreases

with the increase of iron vacancy content.

* Corresponding author. Tel.: +55-61-3107-7756; Fax +55-61-3107-7712;

E-mail address: swsilva@unb.br

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