Microwave hydrothermal synthesis of ceria doped gadolinium nanoparticles

M. S. Ferreira[1], A. C. T. Cabral[1], M. Zampieri[3], E. Longo[3],
J. A. Varela[3], A. Z. Simões[2] and F. Moura[1]

[1] *Laboratório Interdisciplinar de Materiais Avançados, Universidade Federal de Itajubá(UNIFEI) Campus de Itabira, Rua São Paulo 377, Bairro Amazonas, CEP 35900-373 Itabira,Minas Gerais, Brazil.*

[2] *Universidade Estadual Paulista, Campus de Guaratinguetá, SP, Brazil*

[3] *Laboratório Interdisicplinar em Cerâmica, IQ-Araraquara, SP, Brazil*

Crystalline ceria-doped gadolinium $(Ce_{1-x}Gd_xO_{2-\delta})$ nanoparticles have been synthesized by a simple and fast microwave hydrothermal method (HTMW) in the temperature of 100 °C for 5 minutes. The samples were characterized by thermogravimetric analysis (TG-DTA), X-ray powder diffraction (XRD), field-emission scanning electron microscopy FE/SEM, fourier transformed-IR techniques. The results showed the crystallization of $(Ce_{1-x}Gd_xO_{2-\delta})$ phase free of residual impurity. FE/SEM analysis reveals that HTMW turns it possible to produce homogeneous powders and reduced particles size. These results show that the HTMW synthesis route is rapid, cost effective, and could serve as an alternative to obtain $Ce_{1-x}Gd_xO_{2-\delta}$ nanoparticles. The $Ce_{1-x}Gd_xO_{2-\delta}$ powder is free of secondary phases and presented cubic crystalline structure. This powder is a potential candidate to electrolyte of oxide solid fuel cells application.

Keywords: Nanoparticles, microwave hydrothermal, SOFC, Ceria doped Gadolinium.

Work supported by CNPq, FAPEMIG and FAPESP.

[1] B. C. H. Steele, Nato Asi Series E, Appl. Sci. **368**, 323 (1997).
[2] H. Huang, X. Feng, W. Zhu, Y. Zhang, T. Wen, J. Phys. Condens. Matter. 15, 5689 (2003).

e-mail: masacardo@yahoo.com.br; endereço: UNIFEI – Campus de Itabira- Rua São Paulo, 377, Bairro Amazonas - Itabira-MG CEP 35900-373