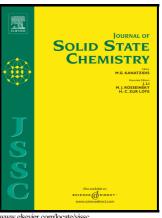
# Author's Accepted Manuscript

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PII: S0022-4596(15)30034-7

DOI: http://dx.doi.org/10.1016/j.jssc.2015.06.027

Reference: YJSSC18954

To appear in: Journal of Solid State Chemistry

Received date: 12 January 2015 Revised date: 9 June 2015 Accepted date: 10 June 2015

Cite this article as: Martin Fabián, Bratislav Antić, Vladimír Girman, Milica Vučinić-Vasić, Aleksandar Kremenović, Shigeru Suzuki, Horst Hahn and Vladimír Šepelák, Mechanosynthesis and structural characterization of nanocrystalline  $Ce_{1-x}Y_xO_{2-\delta}$  (x=0.1–0.35) solid solutions, Journal of Solid State Chemistry, http://dx.doi.org/10.1016/j.jssc.2015.06.027

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## **ACCEPTED MANUSCRIPT**

Mechanosynthesis and structural characterization of nanocrystalline  $Ce_{1-x}Y_xO_{2-\delta}$  (x = 0.1 – 0.35) solid solutions

Martin Fabián<sup>a,b,\*</sup>, Bratislav Antić<sup>c</sup>, Vladimír Girman<sup>d</sup>, Milica Vučinić-Vasić<sup>e</sup>, Aleksandar Kremenović<sup>f</sup>, Shigeru Suzuki<sup>g</sup>, Horst Hahn<sup>a</sup> and Vladimír Šepelák<sup>a,b</sup>

<sup>a</sup>Institute of Nanotechnology, Karlsruhe Institute of Technology, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

<sup>b</sup>Institute of Geotechnics, Slovak Academy of Sciences, Watsonova 45, 04001 Košice, Slovakia

<sup>c</sup>"Vinča" Institute of Nuclear Sciences, University of Belgrade, P.O. Box 522, 11001 Belgrade, Serbia

<sup>d</sup>Institute of Physics, P. J. Šafárik University, Park Angelinum 9, 04154 Košice, Slovakia

<sup>e</sup>Faculty of Technical Sciences, University of Novi Sad, Trg D. Obradovića 6, 21000 Novi Sad, Serbia

<sup>f</sup>Laboratory of Crystallography, Faculty of Mining and Geology, University of Belgrade, Djusina 7, 11001 Belgrade, Serbia

<sup>g</sup>Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Katahira 2-1-1, Aoba-ku, 980-8577 Sendai, Japan

#### Abstract

A series of nanostructured fluorite-type  $Ce_{1-x}Y_xO_{2-\delta}$  ( $0 \le x \le 0.35$ ) solid solutions, prepared via high-energy milling of the  $CeO_2/Y_2O_3$  mixtures, are investigated by XRD, HR-TEM, EDS and Raman spectroscopy. For the first time, complementary information on both the long-range and short-range structural features of mechanosynthesized  $Ce_{1-x}Y_xO_{2-\delta}$ , obtained by Rietveld analysis of XRD data and Raman spectroscopy, is provided. The lattice parameters of the as-prepared solid solutions decrease with increasing yttrium content. Rietveld refinements of the XRD data reveal increase in microstrains in the host ceria lattice as a consequence of yttrium incorporation. Raman spectra are directly affected by the presence of oxygen vacancies; their existence is evidenced by the presence of vibration modes at ~ 560 and ~ 600 cm<sup>-1</sup>. The detailed spectroscopic investigations enable us to separate extrinsic and intrinsic origin of oxygen vacancies. It is demonstrated that mechanosynthesis

\* Corresponding author. Tel.: +421-55-7922608; Fax: +421-55-7922604; E-mail: fabianm@saske.sk.

1

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