ABSTRACTS BOOK

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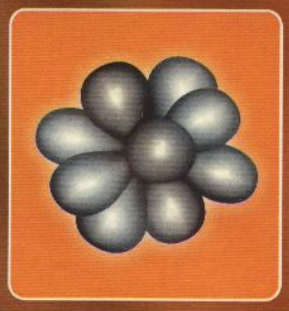

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STRUCTURAL AND ELECTRICAL PROPERTIES OF RARE EARTH ION DOPED FORSTERITE NANOCERAMICS

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Mg_2SiO_4, also known as forsterite, is an example of industry-important material [1]. Forsterite meets basic requirements for high-frequency applications and is used, in particular, for the fabrication of electro ceramics, high-quality insulators with low dielectric losses, luminophores, ceramic implants and a variety of other devices. During last decades a particular attention is paid to study ion-doped Mg_2SiO_4, first of all due to tunable near-IR lasing activity and interesting luminescent properties. Although most efforts are aimed to utilize forsterite crystals for optical purposes, it was demonstrated that ion activated forsterite nanoceramics are as well prospective, for example, in the fabrication of optical fibers.

Recently, several successful attempts to synthesize forsterite nanostructures were reported, including nanowires and nanopowders obtained via sol-gel route. However, most reports are restricted to the synthesis and optical properties, while there is a lack of knowledge about the effect of activating ion on the electrical transport in forsterite nanoceramics. Aiming to bridge this gap, present report deals with the synthesis and structural/impedance characterization of forsterite-based nanopowders, obtained by modifying of the Mg_2SiO_4 structure with Y^{3+} ions.

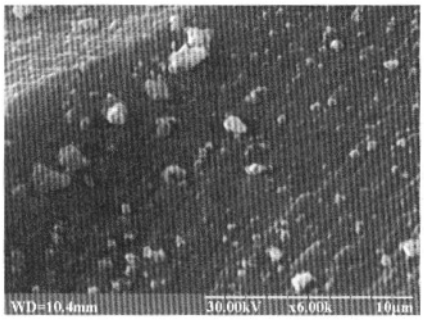

Fig. 4. Typical SEM image of the obtained forsterite nanoceramics

Activated nanoceramics with the average grain size of about 35 nm were prepared using sol-gel forsterite powder. Synthesized nanomaterials were characterized by means of XRD, SEM and impedance spectroscopy techniques (see Fig. 1 for typical SEM image of the obtained nanomaterial). The effect of the rare earth ions on the electrical properties is emphasized. Bulk and grain boundary contributions to the total electric conductivity were separated analyzing the measured impedance data in the frequency range of 2 to 10^6 Hz.

[1] K.P. Sanosh, A. Balakrishan, L. Francis, N.N. Kim, *J. Alloys Comp.* **495** (2010) 113.