Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VIII
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 23-25. September 2019.

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P5

The usage of different fluoride sources during solvothermal synthesis of UCNPs in hydroxyl-carboxyl chelated precursor

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There is a great interest for the synthesis of rare earth (RE) doped up-converting nanoparticles (UCNPs) which morphological and luminescence properties are well suited for application in optoelectronics, forensics, security and biomedicine. The synthesis of such particles usually comprises decomposition of organometallic compounds in an oxygen-free environment followed with coating of biocompatible layer or ligands exchange. In this work hydroxyl-carboxyl (HO-C) type of chelators (citric acid and sodium citrate) are used for the stabilization of $NaYF_4$:Gd,Yb,Er UCNPs during solvothermal treatment of rare earth nitrate salts with different fluoride sources (NaF, NH_4F and NH_4HF_2). The x-ray powder diffraction (XRPD) showed that all powders contain the mixture of cubic and hexagonal $NaYF_4$:Gd,Yb,Er phase in nano and micro-sized particles respectively. However, the content of later one prevails in samples obtain when Na-citrate is used as chelator, regardless of which fluoride source is used for precipitation. Additionally, variation of the particles size and shape is detected with a variation of fluoride type. All particles have hydrophilic surface due to retention of citrate ligands and emit intense green light emission centered at 519 and 539 nm ($^2H_{11/2}$,$^4S_{3/2}\rightarrow{}^4I_{15/2}$) when excited with near infrared light.

P6

Barium titanat - electronic ceramics and further Brownian motion fractal analysis development

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Considering that until now there has been a positive fractal dimension of the charge carrier trajectories in doped $BaTiO_3$-ceramics, it would be interesting to consider its complex variant. The trajectories then have a new logarithmic scaling symmetry. It adversely affects to the conductive properties of these materials. AC conductivity studies of various $BaTiO_3$ or similar ceramics produced equivalent circuits with impedance spectra, usually within the framework of CPE elements serial connection (CPE - constant phase element). CPE, as a as a consequence of complex fractal dimension have a new behavior. Dielectric frequency spectra can be described in similar relations.