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ADVANCED CERAMICS AND APPLICATION II
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials
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PROGRAM AND THE BOOK OF ABSTRACTS

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activation extended. Also, the additional modes attributed to TiO_2 II, srilankite and rutile phases started to appear as a consequence of activation.

P16

Annealing and doping concentration effects of Y_2O_3: Sm^{3+}nanopowder obtained by self-propagation room temperature reaction

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In this report, structure, morphology and luminescence of Y_2O_3:Sm^{3+}nanoparticles prepared by self-propagating room temperature reaction are presented. This new, simple and cost effective synthesis allows obtaining desired phase composition by mixing appropriate amounts of yttrium and samarium nitrates together with sodium hydroxide. A set of samples is prepared with different Sm^{3+}concentrations (0.1, 0.2, 0.5, 1 and 2 at %) in order to observe changes of luminescence properties. Also, effects of post synthesis annealing at several temperatures (600 °C, 800 °C and 1100 °C) are analyzed. For all samples X-ray diffraction showed that powders have cubic bixbyite structure (Ia-3), and TEM analysis showed particles of about 50 nm. Luminescence emission spectra clearly show peaks characteristic for electronic spin-forbidden transition of Sm^{3+} ions $^4G_{5/2}\rightarrow{}^6H_{5/2}$, $^6H_{7/2}$ and $^6H_{9/2}$ centered at 578, 607 and 654 nm, respectively. Emission lifetime values decrease with Sm^{3+} ion concentration increments, from 1.94ms for 0.1 at% to 0.97 ms for 2 at%. In addition, enlargement of lifetime values observed when thermal treatment is done at the highest temperature due to the elimination of luminescence quenching species from the surface of particles.

P17

Effect of processing parameters on structural and morphological Y_2O_3 :Yb^{3+}/Ho^{3+} powders characteristics

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Up-converting yttrium oxide powders doped with Yb^{3+} and co-doped with Ho^{3+} were synthesized through hydrothermal processing at 200 °C/3 h. Reverse precipitation of the starting nitrates mixture is performed with the help of ammonium hydrogen carbonate (AHC) solution up to pH 7 or pH 9 prior to hydrothermal treatment. Morphological features of the as-prepared (asp) powders and rare earth oxides obtained after powders additional annealing at 1100 ^oC (3 and 12 h) are discussed based on X-ray powder diffractometry (XRPD), scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). Structural refinement confirmed generation of the cubic bixbyte-structure (S.G. *Ia*-3) with non-uniform accomodation of dopants at C_2 and S_6 cationic sites. SEM revealed that the particles have plate-like or rod-like morphology in dependence of hydrothermal processing (pH). Due to the fact that are composed from nanograins (30-100 nm) they

demonstrate prominent green luminescence centered at 550 nm after been excited with the infrared laser source (λ=978 nm).

P18

Dielectric characterization of microalloyed alumo-silicate ceramics by using linear regression model

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In this paper, dielectric characterization of porous alumo-silicate ceramics, modified by alloying with magnesium and microalloying with aluminum, was investigated. Microstructure investigations have revealed non-uniform and highly porous structure with broad distribution of grain size, specifically shaped grains and high degree of agglomeration. Complex multiphase system, as active microalloyed ceramics, has specific behavior under external electrical field influence. Dielectric properties (the changes of permittivity, electrical resistivity, dielectric losses and impedance) were measured in the frequency range 20 Hz – 1 MHz. All characteristics showed nonlinear distribution and complex functional dependences because of significant nonhomogeneity of active microalloyed ceramics. Values for permittivity ranged between 140 – 430. Order of magnitude for electrical resistivity was about 10^6 Ωm, for impedance 10^4 – 10^8 Ω, and loss tangent had values much greater than 0.05. Mathematical model of linear regression was applied on the dielectric characterization results. Consistency with experimental data was approved, since the values for correlation coefficient r and determination coefficient r^2 were obtained near value 1.