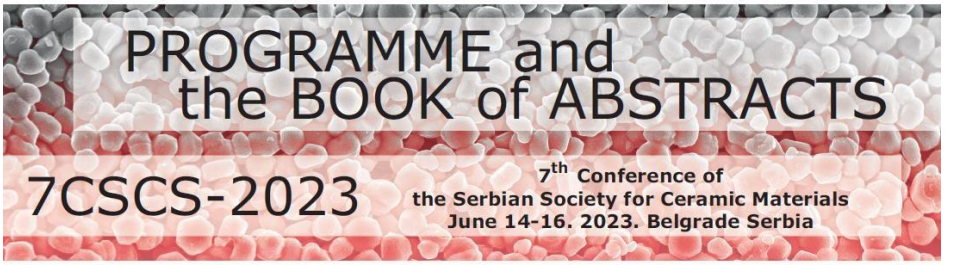
The Serbian Society for Ceramic Materials
Institute for Multidisciplinary Research (IMSI), University of Belgrade
Institute of Physics, University of Belgrade
Center of Excellence for the Synthesis, Processing and Characterization of Materials for use in Extreme Conditions "CEXTREME LAB" - Institute of Nuclear Sciences "Vinča", University of Belgrade
Faculty of Mechanical Engineering, University of Belgrade
Center of Excellence for Green Technologies, Institute for Multidisciplinary Research, University of Belgrade
Faculty of Technology and Metallurgy, University of Belgrade



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Branko Matović
Jelena Maletaškić
Vladimir V. Srdić

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SYNTHESIS OF Eu AND Yb BASED DIRAC SEMIMETALS

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Dirac semimetals are a new class of materials with a broad scope of promising future applications. [1] Synthesis of monocrystals of these materials is often difficult and requires special attention and dedication. [2] Europium and Ytterbium are highly susceptible to oxidation, and the synthesis requires procedures being done inside an inert atmosphere or vacuum. The crystal grower must take many effects into account in order to acquire high-quality monocrystals, which can then be used to investigate novel properties intrinsic to the material.

We will present crystal growth techniques used in our laboratory to obtain high-quality Dirac semimetals. We shall discuss the use of different equipment used in the crystal growth process, including the Bridgman furnace, and how they are used in the synthesis of materials such as $EuCd_2As_2$, $EuMnBi_2$ and $YbMnBi_2$.

1. A. Burkov, *Nature Mater* **15** (2016) 1145–1148
2. M. Tachibana, *Beginner's Guide to Flux Crystal Growth* (2017) 978-4-431-56587-1.

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ENHANCEMENT OF UP-CONVERSION LUMINESCENT CHARACTERISTICS OF Yb^{3+}/Ho^{3+} CO-DOPED Bi^{3+} BASED $SrGd_2O_4$ NANOPARTICLES

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In this investigation, samples of $SrGd_2O_4$ doped with different Yb^{3+} (2, 4, 6 at.%) ions and constant Ho^{3+} (1 at.%) and Bi^{3+} (2 at.%) concentrations were prepared. The sol-gel method with glycine as a fuel and citric acid as a chelator was chosen for sample preparation. All samples were heated in the furnace for 1.5 h at

500 °C and then thermally treated for 2.5 h at 1000 °C. The pure orthorhombic lattice of $SrGd_2O_4$, space group *Pnma*, was revealed by X-ray diffraction (XRD) (JCPDS Card No.:01-072-6387). Transmission electron microscopy (TEM) discovered agglomerated clusters of spherical particles measuring around 150 nm in size. Including Bi^{3+} ions into the structure influenced the morphology of the sample showing fine packing of pyramidal-shaped nanoparticles. The uniform distribution of constitutive elements in the samples was confirmed by energy dispersive spectroscopy (EDS). Up-conversion emission properties were evaluated from photoluminescent emission spectra and intensity dependence on excitation power after excitation at 976 nm. Dominant green (550 nm), red (671 nm), and infrared (758 nm) $^5F_4$, $^5S_2 \rightarrow {}^5I_8$, $^5F_5 \rightarrow {}^5I_8$, $^5F_4$, $^5S_2 \rightarrow {}^5I_7$ transition emissions, respectively, are detected in all samples. The sample co-doped with Bi^{3+} showed the most intense photoluminescent emission.

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BACTERIAL CELLULOSE (BC)-CeO_2 NANOCOMPOSITE FILM FOR CHRONIC WOUND TREATMENT

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Bacterial cellulose (BC) is a promising natural polymer with a range of characteristics such as biocompatibility, microporosity, transparency, conformability, elasticity, the ability to preserve a moist environment, as well as absorb exudates in wounds. That is why BC is an attractive material in biomedical applications, especially in skin tissue repairing, but its lack of antimicrobial activity limits its performance. To overcome this shortage, BC was combined with cerium (IV)-oxide (CeO_2) nanoparticles. For $BCCeO_2$ /1, NPs were randomly distributed among BC nanofibers, and for this sample the reduction of MN frequency was most pronounced. $BCCeO_2$ /1 also showed the highest protection from the effect of H_2O_2 on cell proliferation. Redox parameters in blood plasma samples were also examined. All of the composites have antimicrobial activity in comparison with the control sample. This material has possible application as a wound-healing material, especially in chronic wound treatment.