



Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
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, 26-27. September 2022.

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Deviation measurement of SLS PA material regarding location and orientation of printing

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SLS technology is widely used in several industries worldwide mainly due to its ability to manufacture complex geometry components with less effort compared to conventional methods. Such technology uses materials in powder form, the most common ones are polyamides (PA), polystyrenes, thermoplastic elastomers, and polyaryletherketones. Research covers flexural PA12 specimens, with CAD model dimensions selected according to the ISO 178 standard, with 96x8x4 [mm] in bulk. Printing was performed on Fuse 1 (FormLabs, Summerville, MA) machine with four batches, differing in printing orientation and printing location. Vertical and horizontal orientations are applied, and each orientation is combined with the printing location, i.e., in the middle and on the edge of the powder bed. Printed specimens are scanned and obtained scans are then compared with original CAD model in the GOM Inspect program. All four specimen batches have deviation maximum on lateral sides, where the surface is minimal. Nearly 0.42 mm deviations are present in horizontally printed specimens placed in the middle of the powder bed, and these values are maximal recorded deviations. Worth mentioning are vertical specimens printed in the middle, which show not only lateral deviations but possess 0.07 mm deviations on largest surface, i.e., on 96x8 mm one.

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Optically active SrGd₂O₄ phase: Yb³⁺/Ho³⁺ and Yb³⁺/Tm³⁺ co-doping

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Optically active materials have a wide range of applications. The phenomenon of light conversion includes two main types: up-conversion, which is the ability of conversion lower energy photons into the ones with the higher energy, and down-conversion, which is vice versa. Orthorhombic SrGd₂O₄ doped with rare earth elements is established to have promising optical characteristics, but rarely explored until nowadays as up-converting material. Due to the phonon energy of around 475 cm⁻¹, which is lower than in many other compounds commonly used hosts, this one has a great perspective as an optically active

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Laser sintered polyamide specimens - fabrication and tensile testing conditions on different geometries

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This work presents the fabrication and tensile testing of polyamide specimens fabricated by selective laser sintering (SLS). Two geometries are considered: SENT (Single Edge Notched Tension) and PRNT (Pipe Ring Notched Tension) specimens. Experimental testing of these specimens is a step in development of a new method for testing of properties of the pipeline materials. The samples were produced by SLS (Selective Laser Sintering) additive production technique. The samples were made from polyamide PA12 on EOS Formiga P100 machine (fabrication parameters: laser power 30 W, print layer height 0.1 mm, scanning speed 1.6-5 m/s, operating temperature 170°C). Testing was performed in the displacement control on a universal tensile testing machine Shimadzu AGS - X. On this machine, the values of force as well as the values of stress and strain were obtained directly from the Trapezium X software. Special attention in this work is devoted to two important aspects: fixing of the ring specimen for testing and influence of friction between the specimen and the tool. The results obtained on the examined specimens indicate that this study is a valuable contribution for further development and verification of the new fracture resistance testing procedure for different pipeline materials.

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