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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