

Study of sintering $\text{La}_2\text{O}_3\text{-Al}_2\text{O}_3\text{-SiO}_2$ glasses with gas pressure sintering technology

Z. Pan¹, St. Grimm¹, S. Dochow¹, D. Litzkendorf¹, K. Schuster¹, A. Kriltz², W. Seeber³

¹ Leibniz Institute of Photonic Technology, Albert-Einstein-Str. 9, 07745 Jena

² Institute of Physical Chemistry, Friedrich-Schiller-Universität Jena, Lessingstr. 10, 07743 Jena

³ Otto-Schott-Institut, Friedrich-Schiller-Universität Jena, Fraunhoferstr.6, 07743 Jena

ABSTRACT

This work employs Hot Isostatic Pressing (HIP) sintering technology with Argon in preparation for rare earth doped aluminosilicate glass, which aims at high power applications. The pressure sintering technologies such as HIP, Spark Plasma Sintering (SPS) and Hot Pressing (HP) simultaneously apply heat and pressure in sintering glass from powders, which eliminate internal micro porosity through creep, plastic deformation and diffusion bonding. Therefore casting defects such as shrinkage and gas porosity could be avoided. The effect of changing oxidation state has been observed in Yb-doped SAL glass and the effect of lower crystallinity is observed in Raman spectrum. With our technology, carbon contamination which is the typical contamination in pressure sintering^[1] has not been observed.

[1] Bertrand, A., Carreaud, J., Delaizir, G., Duclère, J.-R., Colas, M., Cornette, J., Vandenhende, M., Couderc, V., Thomas, P. (2014), A Comprehensive Study of the Carbon Contamination in Tellurite Glasses and Glass-Ceramics Sintered by Spark Plasma Sintering (SPS). *Journal of the American Ceramic Society*, 97: 163–172. doi: 10.1111/jace.12657