



PROJECT "THEORY AND APPLICATIONS OF SINTER-CRYSTALLIZATION" DN 19/7

## **Sinter-crystallization and foaming of glass from metallurgical slag**

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**Abstract:** We use for the synthesis modified waste raw materials in the form of slags (up to 70 % wt.) with addition of quartz sand and calcium fluoride. The initial batch is being melted at 1400 °C and then aqueously quenched. The resulting glass frit is ground below 75 microns, pressed into "green" samples and exposed to thermal scanning at different temperatures with different heating rates, holding temperatures and times.

In the framework of current research is presented analysis of the possibilities to obtain new glass-ceramic materials by densification and/or foaming by means of customized optical Hot-Stage Microscopy (HSM) and dilatometry (ODLT) in air and Argon atmospheres. These experiments comprise measurements of the sintering curves, analysis of the volume shrinkage and volume expansion while the structure of the obtained samples was studied in details with micro Computer Tomography (CT).

The highlighted method of production described here allows the manufacturing of three types of new materials on demand by the corresponding industrial needs by using the same pressed glass powders. It is demonstrated a flexibility of the synthesis obtaining well compacted glass-ceramics at temperatures of 900 °C characterized by dense structure and good mechanical properties; self-glazed glass-ceramics at 1000 °C characterized by fine smooth "commercial" surface and finally glass-ceramic foams at 1100 °C characterized by very low specific weight, 85-90 % closed porosity and good thermal stability above 1000 °C.