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| Influence of foaming agents on both the structure and the thermal conductivity of silicate glasses |
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| ***Oral presentation*** |
| Foam glass is one of the most promising insulation materials for constructions since it has low thermal conductivity, high compressive strength, non-water permeability, and high fire resistance. They can be produced using cullet sources, e.g., cathode ray tubes (CRT) panel glass, and foaming agents such as metal carbonates, or oxidizing transition metal oxides combined with carbonaceous sources. In this work, we mix CRT panel glass powder with different foaming agents: CaCO3 (0-4 wt%), Fe2O3 (0-6 wt%), and MnxOy (0-10 wt%). The powder mixtures are sintered in the range between the glass transition temperature (*T*g) and the foaming temperature (corresponding to the viscosity range of 1012-106 Pa s) at 10 K/min and cool down to 773 K (below *T*g) at 30 K/min and naturally down to room temperature. Upon sintering, the foaming agents are partially incorporated into the glass structure. Afterwards we measure the thermal conductivity of the sintered samples with Laser Flash Technique to see its dependence on the degree of incorporation of the foaming agents into the glass structure. In parallel we prepare glass samples by adding the above-mentioned foaming agents to the CRT panel glass via high temperature (about 1500 °C) melting and subsequent quenching. We compare the thermal conductivity of re-melted samples with that of the sintered samples to study the influence of the structural incorporation of the foaming agents on the thermal conductivity. The samples could crystallize during the heating process, and thereby their thermal conductivity can be influenced. The crystallinity of the samples is determined by means of X-ray diffraction. The change of the glass structure can be indirectly reflected by *T*g change which is measured using a differential scanning calorimeter.  |
| Brief Biographical NotesMartin Bonderup Østergaard is a first year PhD student supervised by Professor Yuanzheng Yue at Aalborg University, Denmark. The purpose of his project is to develop and improve the insulating ability of foam glasses for use in new constructions. He graduated from Section of Chemistry at Aalborg University in 2015. During his MSc he has conducted high-pressure experiments on oxide glasses at Institute of High-Pressure Physics, Polish Academy of Sciences, Warsaw, Poland, and investigated the pressure-induced changes in both structural and mechanical properties. In this topic he has published two papers in international peer-reviewed journals. |