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Petersen, Rasmus Rosenlund; König, Jakob; Yue, Yuanzheng

Publication date:
2014

Document Version
Early version, also known as pre-print

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Petersen, R. R., König, J., & Yue, Y. (2014). Thermal Conductivity of Foam Glass. Poster presented at 1st Joint Meeting of DGG – ACerS GOMD, Aachen, Germany.

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Thermal Conductivity of Foam Glass

Rasmus R. Petersen^{1,*}, Jakob König^{1,2}, Yuanzheng Yue¹

¹ Section of Chemistry, Aalborg University, DK-9000 Aalborg, Denmark

² Advanced Materials Department, Jožef Stefan Institute, SI-1000 Ljubljana, Slovenia

* Corresponding author. E-mail: rp@bio.aau.dk

Due to the increased focus on energy savings and waste recycling foam glass materials have gained increased attention. The production process of foam glass is a potential low-cost recycle option for challenging waste, e.g. CRT glass and industrial waste (fly ash and slags). Foam glass is used as thermal insulating material in building and chemical industry. The large volume of gas (porosity 90 – 95%) is the main reason of the low thermal conductivity of the foam glass. If gases with lower thermal conductivity compared to air are entrapped in the glass melt, the derived foam glass will contain only closed pores and its overall thermal conductivity will be much lower than that of the foam glass with open pores. In this work we have prepared foam glass using different types of recycled glasses and different kinds of foaming agents. This enabled the formation of foam glasses having gas cells with different gas compositions. The foam glasses were characterised concerning densities, open/closed porosity and crystallinity. We find out, through analytical calculations and experiments, how the thermal conductivity of foam glass depends on density, glass composition and gas composition. Certain glass types could have a significant advantage for getting low thermal conductivity when recycled for thermal insulation applications. The impact of crystallisation on the thermal conductivity of foam glasses is also discussed.