Mechanism of Foaming Light-Weight Glass Foams

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Glass foam has become an increasing valuable option as building material. They are manufactured by mixing glass powder together with one or more foaming agents. Upon heat treatment the glass densifies through viscous sintering and enclosed bubbles are formed. Increasing the temperature to a viscosity between 104 to 106 Pa s induces reaction of the foaming agents and the closed bubbles expand, creating a porous structure in the glass melt. By cooling the viscous foam to room temperature the porous structure is frozen-in. The resulting glass foam is applied as thermal insulating glass foam in the construction sector and industry and as light weight filling for infrastructure.

The choice of foaming agent has great impact on the foaming ability and the resulting properties. By comparing several studies on foaming ability we define a viscous window of preparing glass foams with low density. We show the recent progress on understanding the underlying reaction mechanism of foaming. Gas analysis, closed porosity and *in-situ­* techniques, such as heating microscope, high temperature SEM and DTA-MS have been valuable tools to identify foaming reactions. Our studies focus mainly on the recycling of obsolete television glass into glass foams. Though the reaction mechanisms are found for television glass, they are applicable to other glass and glass-ceramic systems.