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Abstract:
T_l is a thermodynamic temperature, which is of scientific and technical importance. Theoretically, the liquidus temperature (T_l) is defined as the high temperature limit, at which no crystals can survive. However, practically it is challenging to determine T_l of a glass-forming composition, in particular, of multi-component systems. The experimentally determined T_l values often deviate from those predicted from the Lindeman model. It is known that the structurally ordered domains could exist even above experimentally determined T_l. Various methods have been applied to determine T_l in glass science and industry. The offset point (T_{offset}) of the DSC melting peak is regarded as the temperature at which the last crystal vanishes. The extrapolated T_{offset} value can be defined as calorimetric T_l. We investigate the liquidus temperature of some stone wool compositions. We found that when the temperature is above the practical calorimetric T_l, the crystal structure is partly remembered by the liquid, or the ordered crystal-like structure still exists, although the crystals disappear. This is evidenced by the fact that the position of the crystallization peak shifts to higher temperature with increasing numbers of DSC downscans. However, when the maximum scanning temperature (T_{max}) reaches a certain value, not only crystals, but also the remembered crystal structure is eliminated. This T_{max} could be defined as the thermodynamic T_l.

References

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