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# Fracture toughness of homogenous and demixed sodium borosilicate glasses

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## Abstract

Sodium borosilicate glasses are of particular technological importance due to their excellent thermal, mechanical and chemical properties, but are subject to phase separation, which, depending on the composition, can occur already after moulding or after prolonged annealing above the glass transition. While the fracture toughness of homogeneous glasses is determined by bond strength and network structure, additional parameters of microstructure are taken into account for phase-separated glasses. For the latter, thermal expansion and elastic mismatch as well as domain connectivity issues were discussed. To test these concepts, four different glasses were prepared within the phase separation region of the Na<sub>2</sub>O-B<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> system and the fracture toughness was measured using the standard self-consistent single edge pre-crack beam (SEPB) method for different stages of the microstructural phase evolution.

**Keywords:** fracture toughness, sodium borosilicate glasses, phase separation

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