Structure of (11B2O3)0.3(GeO2)0.7 glass at pressures up to 8.2 GPa

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Abstract

The B2O3-GeO2 system is one of the few oxide glass-forming materials that comprises solely network-forming cations, and the local motifs in the pure component glasses B2O3 and GeO2, are rather different [1]. Boron oxide, or B2O3, is formed of corner-sharing planar triangles that link to create B3O6 boroxol rings. The structure of glassy germania, or GeO2 is based on corner-sharing tetrahedra.
Investigating the structure of glasses under high pressures allows changes in their atomic level structure to be followed gradually.

Structural variation that occur in (11B2O3)0.3(GeO2)0.7 glass under pressure were investigated by using neutron diffraction at pressures up to 8.2(5) GPa. The coordination numbers nBO and nGeO start to increase at 5.4(5) GPa, and they reach values of nBO = 3.5(1) and *nGeO* = 4.5(1) at 8.2(5) GPa.

The pressure dependence of coordination numbers and bond distances is presented and the results are compared to those obtained via the same experimental method for pure B2O3 and GeO2.
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