# Effect of pressure on the structure of albite liquid near glass transition

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The network structure and density of albite glasses recovered from high pressure (to 7.2 GPa) and annealing temperatures across the liquid-glass transition region ($T_g$) were analyzed *ex situ* using high-field $^{27}$Al magic-angle-spinning nuclear magnetic resonance (NMR) spectroscopy. For each pressure, $^{27}$Al NMR spectra show only subtle changes in the Al-O bonding environment at temperatures ranging from $T_g-100$K to $T_g+50$K. From these data, we calculate robust values for average aluminium coordination number and the mean quadrupolar coupling constant ($C_q$)-a proxy for the distortion and distribution of Al-O bonding environments- at fictive temperatures ($T_f$) near $T_g$. While $C_q$ increases linearly with density and pressure, the average Al number only increases above 2.6 GPa. Interestingly, in samples annealed in the vicinity of $T_g$, the fraction of $^{[6]}$Al is consistent with the results of MD simulations with pressure[1,2]. However, we find that the fraction of $^{[5]}$Al is greater in MD simulations, reflecting the structure at temperatures >1000-3000 K higher than what is measured experimentally in glasses, where $T_f$ is much closer to $T_g$. In albite and other sodium aluminosilicate liquids, high pressure-temperature simulation and experimental studies correlate maxima in $O^{2-}$ diffusivity with either critical fractions of high-coordinated Al + Si[1] or the onset of increasing fraction of high-coordinated Al[3]. The possible role of such structural controls on transport properties with pressure will will be discussed over all temperatures where liquid-like behavior exists.

[1] Bryce et al. (1999) *Am Min.* **84**, 345-356 [2]Suzuki et al. (2002) *Phys. Chem. Min.*, **29**, 159-164. [3] Wang et al. (2014) *Nat. Commun.* **5**, doi:10.1038/ncomms4241.