Contribution ID : **101** Type : **Oral**

In situ XAS measurement of silicate liquids using the high pressure and temperature D-DIA facility at the Australian Synchrotron

Monday, 2 December 2019 14:30 (15)

Geochemical variation in the Earth, such as the chemical differences between the core, mantle and crust, are fundamentally explained through understanding of how elements
are partitioned amongst metals, minerals and melts over a wide range of pressures, temperatures, and redox conditions. The dominant framework for considering trace element behaviour in mineral/silicate-melt systems is the lattice strain model that considers
substitution of size and charge mismatched elements into crystals in terms of distributing excess elastic and electrostatic energy throughout the crystal lattice. However, the lattice strain model disregards changes in melt structure. Abundant experimental evidence demonstrates that cations in silicate liquids begin increasing average coordination numbers at pressures as low as ~ 3 GPa. Changes in silicate liquid structure with pressure (polyamorphism) is a possible cause. Speciation (coordination and valence state) of metal cations in silicate liquids is not always faithfully preserved in glasses upon quenching.
There are few extant in situ studies of element coordination as a function of pressure in liquids or glasses, and even fewer applying XAS. Without high quality in situ measurements, it is difficult to determine the utility of speciation data collected from quenched glasses, or glasses annealed at high pressure. Here we present experimental results aimed at understanding the speciation of key trace cations in geologically relevant silicate melts, in situ, at high pressure and temperature.
In-situ studies are critical as we can directly investigate chemical behaviour in melts, not glasses, which likely do not fully preserve the liquid structure upon quenching.

Speakers Gender

Female

Travel Funding

No

Level of Expertise

Expert

Do yo wish to take part in the poster slam

No

Primary author(s) : RUSHMER, Tracy (Macquarie University); WYKES, Jeremy (Australian Synchrotron); MALLMANN, Guiherme (Australian National University)

Presenter(s) : RUSHMER, Tracy (Macquarie University)

Session Classification : Session 8

Track Classification : Earth, interstellar and extreme environments