

**SiO<sub>2</sub> CONDENSATION INTO CAO-AL<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> MELTS AT HIGH SiO(G) PARTIAL PRESSURES**

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**Introduction:** Direct interaction between the presolar nebular gas and silicate solid/melt may have played a major role during the formation of the first solids of the protoplanetary disk [1]. Silicon as moderate volatile element was suggested to get evaporated and to form elevated SiO(g) partial pressures in nebular regions with increased dust/gas ratio. High SiO(g) partial pressures could then be responsible for re-condensation in melt [1]. In order to explore this putative nebular gas-melt interaction, we conducted preliminary silica condensation experiments in the system CaO-Al<sub>2</sub>O<sub>3</sub>-SiO<sub>2</sub> at high temperature and in reducing atmosphere.

**Methods:** These first experiments were made at 1 bar total pressure in a muffle furnace at 1550°C for different times (30-480 minutes). A source and 5 target materials from the CAS system (with  $m_{\text{CaO}} = m_{\text{Al}_2\text{O}_3}$  and 0-88 wt.% SiO<sub>2(bulk)}</sub>) were loaded in small graphite crucibles and placed together inside of a larger graphite crucible. This larger crucible was sited together with graphite powder in an alumina pot in the furnace. During the runs, a gas with high P<sub>SiO(g)</sub> was formed inside of the larger graphite crucible by heating and melting source material together with the different target materials. The mass of the source material in an experiment was 5-8 x higher than the mass of one target material.

**Results/Discussion:** Depending to the imposed P<sub>SiO(g)</sub> by the source in the device, we will show that CAS melt samples may have lost or gained SiO<sub>2</sub>, according of their own starting compositions. At equilibrium conditions, most target materials have however similar SiO<sub>2</sub> contents. This suggests the attainment of silica saturation in the melts with respect to the imposed conditions (P<sub>SiO(g)</sub>, T°C, ...).

By changing the source of SiO(g) in this device, we will show how P<sub>SiO(g)</sub> may control i) the solubility of SiO<sub>2</sub> in CAS melts in supraliquidus experiments, and ii) the phase relationship in the CAS system. Further experiments at lower total pressures are in progress.

**References:**

[1] Tissandier, L., et al. (2002), Gas-melt interactions and their bearing on chondrule formation, *Meteorit Planet Sci*, 37, 1377-1389