# POSTER SESSION

DAY 2 – Feb.14, 2017
5:30 pm – 6:30 pm

## Condensation Experiments in the Mg-Si-O System

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**Introduction:** Enstatite whiskers elongated to the [001] axis were identified in chondritic porous interplanetary dust particles (CP-IDPs), Antarctica Micrometeorite (AMM), and samples from a comet Wild 2, while those elongated to the [001] axis are common in minerals occurred in the Earth and meteorites [1-4]. The difference in the morphology of enstatite whiskers reflects their different condensation conditions in the early solar system [5-7]. In order to constrain on the formation conditions of enstatite whiskers with different crystal habits, we performed condensation experiments of enstatite at low super saturation ratios.

**Experiments:** Experiments were performed in a stainless-steel vacuum chamber with a W-mesh heater. MgO and $SiO_2$ powders were used as a gas source. Each powder was put in a small cell with a hole on the lid. The cells were placed in a cylindrical Ir-crucible and a Pt or Ir-wire was hung at the center of the crucible as a substrate for condensation. Temperature gradient inside the crucible was measured by a thermocouple. Gas temperatures were (a) 1650 and (b) 1580 °C. Condensates were observed with FE-SEM (JEOL 7001F). Chemical compositions and crystal structures were analyzed with EDS and EBSD.

**Results:** *(a) Gas temperature of 1650 °C*: No condensate was observed at 1650-1600°C. Forsterite covered the substrate at ~1600°C. Grain size of forsterite is about 10-20 $\mu$m. Roundish clino-enstatite appears at <1580°C. Faceted grains of 15 $\mu$m in size condensed at <1440°C and a small amount of Pt was detected at their grain surfaces and boundaries, which may affect the grain shape. *(a) Gas temperature of 1580 °C*: No condensate was observed at 1580-1520°C. Ortho- or proto-enstatite appeared at very small temperature region of ~1520°C. Those grains are rounded and 5-10 $\mu$m in size. At lower temperature regions between 1520-1380°C, platy shaped clino-enstatite covered the substrate.

**References:** [1] Bradley J. P., Brownlee D. E., Veblen D. R. (1983) *Nature* 301, 473. [2] Noguchi T. et al. (2008) *MAPS*, Abst# 5129. [3] Ishii H. A. et al. (2008) *Science* 319, 447-450. [4] Nakamura-Messenger, K. et al. (2009) *MAPS*, Abst# 5330. [5] Mysen B. O. & Kushiro I. (1988) *AmMin* 73, 1-19. [6] Tsuchiyama A. et al. (1988) Proc. NIPR Symp. Antarct. Meteorites 1, 185-196. [7] Yamada (2002), Master Thesis (Tohoku University)