OBSERVATION OF EJECTION PROCESS OF IRON GLOBULES FROM MELTED CHONDRULES. M. Uesugi[1], M. Oka[1], K. Saiki[1] and A. Tsuchiyama[1]. [1]Department of Earth and Space Science, Graduate School of Science, Osaka University 1-1 Machikaneyama-cho, Toyonaka-shi, Osaka, Japan. E-mail: uesugi@astroboy.ess.sci.osaka-u.ac.jp.

Introduction: Uesugi et al. [1-2] have investigated the possibility of ejection of iron globules from melted chondrules, which may explain depletion of siderophile elements in chondrules compared to the solar elemental abundance [e.g. 3]. The papers indicated that if an iron globule is transported from inside to the surface of a melted chondrule, the iron globule would be ejected to the outside of the chondrule, due to surface tension force [1]. Heating experiments revealed that the ejection of metallic iron from melted silicate material actually occurs, though the ejection process is not directory observed [2]. They also showed that significant evaporation of Fe occurred after the ejection of iron globules. Then a possibility arises that major effect of the ejection may be evaporation, not surface tension.

We investigated the ejection process of Fe from inside to outside of the melted silicate.

Experiment: A mixture of reagent grade oxides was used as a starting material in the present experiments. We used $CaCO_3$, K_2CO_3, and Na_2CO_3 instead of CaO, K_2O and Na_2O. Bulk composition of the sample is solar elemental abundance. Fe was included as FeO in the sample. The sample was compacted into 20 mg pellets with 3 mm radius and 1mm height, and fixed on a Pt wire. The sample and the Pt wire were covered by carbon capsule. Furnace was filled by H_2 atmosphere with 4 torr pressure. The liquidus temperature of this composition is 1900 K. The heating and cooling rate is 100K/min. Samples were observed by X-ray CT at Osaka university, with pixel size 11 μm.

Results and Discussion: More than 90 % of Fe was ejected to the outside of the melted silicate as spherical globules, within 10 sec above 1873 K. In contrast, less than 20 % of Fe was ejected to the outside, if we heated the sample 30 sec at 1843 K. This result indicates that ejection occurs very short duration (~30 sec) from 1843 K to 1873 K. Iron globules inside the melted silicate kept their radius almost constant against the heating duration, though iron globules ejected to the outside of the silicate material gradually reduced as heating duration increases. The reducing of the radius of iron globules would be due to evaporation of Fe, and melted silicate would suppress the evaporation of Fe from iron globules inside of the melted silicate. The silicate material was already partially melted and has smooth surface at 1843 K. This means that Fe evaporation from inside was suppressed at that temperature, and Fe should be ejected as iron globules to the outside. In addition, if the ejection occurred due to the evaporation, quick evaporation would also make it impossible to form iron globules on the surface of the carbon capsules. These results strongly indicate that the ejection of Fe occurs due to the surface tension force.

References: [1] Uesugi M. Sekiya M. and Nakamura T. 2008. *Meteoritics & Planetary Science* 43:717–730. [2] Uesugi M. et al. 2008. *Meteoritics & Planetary Science* 43:A5014. [3] Osborn T. W., et al. 1973. Geochimi. Cosmochimi. Acta 37:1909–1942.