JINJU H5 CHONDRITE: A NEW FALL IN KOREA HAVING NUMEROUS VUGS FILLED WITH VAPOR-PHASE CRYSTALLIZED MINERALS.

B.-G. Choi[1], H. Kim[1], H. Kim[1], J. I. Lee[2], T. H. Kim[2], I. Ahn[2], K. Yi[3] and T. E. Hong[3]. [1]Earth Science Education, Seoul National University, Korea. bchoi@snu.ac.kr. [2]Korea Polar Research Institute. [3]Korea Basic Science Institute.

Four stones having identical petrological characteristics were found at Jinju, Korea, after a fireball observed on 2014, March 9, 20:04 (local time). The meteorite having 34 kg of total mass was classified as H5 ordinary chondrite (Meteoritical Bulletin 103) based on its petrological characteristics and chemical and oxygen isotopic compositions.

The meteorite has high porosity of 19.5 vol.% based on modal analysis and thus low bulk density of 2.93 g/cm^3. Similar to previously reported equilibrated ordinary chondrites having vugs [1-3], the meteorite has euhedral or subhedral crytals grown from the walls of the pores. The vugs are not only found in spaces between chondrules but also inside of some chondrules.

Mineralogy of these vug-filling phases is the same as typical equilibrated ordinary chondrites: low-Ca pyroxene, olivine, Fe-Ni metals, troilite, high-Ca pyroxene, chromite and plagioclase. All of them except plagioclase typically appear as euhedral or subhedral grains with sizes of ~10 μm to ~200 μm. Plagioclase occurs as small (a few μm) droplet-shape on the surfaces of the other euhedral crystals. Morphologies of these crystals and also those in previously reported [1-3] are identical to experimentally produced crystals from vapor [4]: bulky, platy, columnar and droplet shapes.

Two possible scenarios for the vapor formation have been proposed including thermal metamorphism [e.g., 3] and shock heating [e.g., 1, 2]. One of the reason that thermal metamorphism has been proposed as the heat source of vaporization is that there seems no correlation between the occurrence of vug-filling euhedral crystals and the observed shock stages. For instance, Baszkówka and Mount Tazerzait L5 chondrites are assigned as S1 [5], while Yanzhuang H5 is heavily shocked [2]. However, it has been suggested that shock indicators could be erased during post-shock annealing [6]. The shock stage of Jinju H5 chondrite is S3 or higher, based on the observations of planar fractures, undulatory extinction and darkening of olivine and pyroxene and the occurrence of chromite-plagioclase assemblages. If the vaporization occurred during thermal metamorphism, one might expect to find more vapor-phase crystallization in chondrites experienced higher metamorphic degrees. However among 10 ordinary chondrites reported having vug-filling euhedral crystals, two of them are type-6 and 8 of them are type-5 [1-3, this study].

We suspect that these chondrites were neither equilibrated nor compacted when they had the impact events. If so, due to highly porous nature of the meteorites, the shock energy could more transfer to heat that increased temperature enough to vaporize all the fine grained minerals. The retrograde metamorphism after the shock heating might be also responsible for the chemical equilibrium of these meteorites.

References: [1] Olsen E. J. 1981. *Meteoritics* 16: 45-59. [2] Xiande X. and Ming C. 1997. *Science in China* 40: 113-119. [3] Wlotzka F and Otto J. 2001. *Geological Quarterly* 45: 257-262. [4] Kobatake H et al. 2008. *Icarus* 198: 208-217. [5] Pilski A. S. et al. 2001. *Geological Quarterly* 45: 331-342. [6] Rubin A. E. 2004. *Geochimica et Cosmochimica Acta* 68: 673-689.