NOBLE GASES IN YAMATO-82094, A NEW TYPE OF CARBONACEOUS CHONDRITE.

M. K. Haba[1] and K. Nagao[2]. [1]Antarctic Meteorite Research Center, National Institute of Polar Research, Tachikawa, Tokyo 190-8518, Japan. E-mail: haba.makiko@nipr.ac.jp. [2]Geochemical Research Center, Graduate School of Science, University of Tokyo, Bunkyo-ku, Tokyo 113-0033, Japan.

Introduction: Yamato (Y-) 82094 was originally classified as a CO chondrite with petrologic type of 3.5 [1, 2]. However, recent detailed observation of constituents of Y-82094 and the bulk chemical compositions revealed that this meteorite is an unusual C-chondrite with petrologic type of 3.2 [3]. Y-82094 is different from other C-chondrites in terms of the size of chondrules and the contents of volatile elements. It has been suggested that Y-82094 could have formed under high-temperature and reducing condition compared with the other C-chondrites. Here, we report chronological data of Y-82094 and trapped noble gas compositions to clarify genetic relationship with the other C-chondrites.

Samples and methods: Y-82094 (48.76 mg), three CO3 chondrites (Allan Hills 77003 (13.83 mg), Y-791717 (10.83 mg), Y-82050 (8.41 mg)), and one CV3 chondrite (Y-86751 (8.79 mg)) were used in this study. The samples were preheated in borosilicate glass sample holder at 150ºC for a day in order to remove the adsorbed atmospheric noble gases. Y-82094 was heated by a stepwise-heating procedure (T = 300, 500, 800, 1000, 1200, 1400, and 1800ºC) for extraction of noble gases. Noble gases in the other samples were extracted by total melting at 1800ºC. The extracted noble gases were measured with a modified VG5400 (MS-3) mass spectrometer at the University of Tokyo.

Results and discussion: The cosmic-ray exposure ages calculated from cosmogenic ^{21}Ne concentrations (T_{21}) and production rates by [4] are 22, 10, 29, 18, and 25 Ma for Y-82094, ALH-77003, Y-791717, Y-82050, and Y-86751, respectively. The exposure age of Y-82094 is in the range for the other three COs and similar to that of Y-86751 CV chondrite. The exposure age of Y-82094 is also in accordance with the T_{21} distribution histograms of CO, CV, and CK chondrites which show clusters at 20–30 Ma [5]. The radiogenic ^{40}Ar concentration of 650×10^{-8} cc/g in Y-82094 is quite lower than the other CO chondrites. However, the calculated K-Ar age of this meteorite using the K content of 159 ppm reported in [3] is 3500 Ma, which is similar to those of the CO chondrites studied in this work, i.e., 3900, 3900, and 3600 Ma for ALH-77003, Y-791717, and Y-82050, respectively, with K concentration of 334 ppm [6].

Trapped ^{84}Kr and ^{132}Xe concentrations in Y-82094 are 2.3 and 1.8×10^{-8} cc/g, respectively, which are about three times higher than those in the three CO3 and CV3 chondrites measured in this study, and also high compared with those of C-chondrites in literature [5]. The different concentrations support that the Y-82094 meteorite is ungrouped.

References: [1] Yanai K. and Kojima H. 1987. *Petrographic catalog of the Antarctic meteorites.* Tokyo: NIPR. [2] Sears D. W. G. et al. 1991. *Proceedings of the NIPR Symposium on Antarctic Meteorites* 4. pp 319–343. [3] Kimura M. et al. 2014. *Meteoritics & Planetary Science* 49. pp. 346–357. [4] Eugster O. 1988. *Geochimica et Cosmochimica Acta* 52, pp.1649–1662. [5] Scherer P. and Schultz L. 2000. *Meteoritics & Planetary Science* 35. pp. 145–153. [6] Kallemeyn G. W. and Wasson J. T. 1981. *Geochimica et Cosmochimica Acta* 45, pp.1217–1230.