NOBLE GAS STUDIES OF EUCRITES, DIOGENITES AND SOME OTHER ACHONDRITES.

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Introduction: Cosmogenic, radiogenic and fission-derived noble gases provide us important knowledge for cosmic-ray irradiation, impacts on parent bodies, early thermal histories and so on. For detailed discussion based on these components, both measurements and data reduction (e.g., decomposition of measured values into each component) have to be carefully done. Here, I evaluate procedure of data reduction for achondrites, and report obtained characteristic features such as cosmogenic noble gas compositions, ^{244}Pu-Xe age distribution and presence of radiogenic ^{129}Xe.

Samples and analyses: The samples studied here include 30 eucrites, 12 diogenites, a basaltic achondrite (Northwest Africa 011), an angrite (Northwest Africa 1670) and an anomalous CR clan (or primitive achondrite, Tafassasset), among which several data were published before [1, 2]. Noble gases were measured with a mass spectrometer (modified-VG5400) at LEC, University of Tokyo [3, 4]. For gas extraction, total melting or stepwise heating was applied.

Results and discussion: $^{124-130}$Xe is mixtures of trapped (usually terrestrial atmospheric) and cosmogenic Xe. The compositions of cosmogenic Xe in most cases are consistent with those calculated from cosmogenic Xe spectra of Ba and REE targets [5] and Ba/LREE compositions [6, 7]. Some samples such as Asuka 87272 (eucrite) and NWA 011 show slightly Ba-enhanced spectra. ^{128}Xe derived from neutron capture on iodine is not found in all the samples (only Ibitira might have a small amount of excess ^{128}Xe), possibly indicating that thin regolith-like layer covers the eucrite surfaces. This may explain equilibrated textures [8] and/or younger ages (e.g., ~50-100 Ma after Angra dos Reis by ^{244}Pu-Xe ages) observed in many eucrites.

Four eucrites (Ibitira, Juvinas, Pecora Escarpment 82502 and Pecora Escarpment 91007) clearly show excess ^{129}Xe likely derived from extinct ^{129}I. Among the measured eucrites, these have old ^{244}Pu-Xe ages (within ~20 Ma after ADOR). Eucrites with old ^{244}Pu-Xe ages tend to retain radiogenic ^{129}Xe. However, radiogenic ^{129}Xe amounts are not correlated well with ^{244}Pu-Xe ages, and there are eucrites having old ^{244}Pu-Xe ages without radiogenic ^{129}Xe. This is mainly attributed to different contents of iodine among eucrites due to chemical fractionation.

Fission components are dominant at heavy Xe isotopes in several eucrites. Subtracting cosmogenic and ^{238}U-derived fission Xe, ^{244}Pu-derived fission Xe spectra are calculated to be ^{131}Xe : ^{132}Xe : ^{134}Xe : ^{136} Xe = 0.20 (6) : 0.87 (3) : 0.920 (9) : =1, the average of ten data with small errors.

References: [1] Miura Y. N. et al. 1998. *Geochimica et Cosmochimica Acta* 62:2369-2387. [2] Yamaguchi A. et al. 2002. *Science* 296:334-336. [3] Nagao K. et al. 1999. *Antarctic Meteorite Research* 12:81-93. [4] Miura Y. N. et al. 2007. *Geochimica et Cosmochimica Acta* 71:251-270. [5] Hohenberg C. M. et al. 1981. *Geochimica et Cosmochimica Acta* 45:1909-1915. [6] Miura Y. N. et al. in preparation. [7] Koblitz J. 2005. *MetBase 7.1* and references therein. [8] Yamaguchi A. et al. 1996. *Icarus* 124:97-112.