I-XE AGE OF THE YAMATO 74191 (L3.6) CHONDRITE: LATE CLOSURE TIME FOR I-XE SYSTEM WITH ENRICHMENTS IN HALOGENS

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Introduction: Yamato 74191 is classified as L3.6 chondrite. The meteorite is characterized by a very high concentration of neutron-produced ^{80}Kr and ^{82}Kr from Br and ^{128}Xe from ^{127}I along with high concentration of ^{129}Xe from extinct ^{129}I ($T_{1/2}$=15.7 Ma) [1]. The neutron-produced ^{128}Xe shows nice correlation with radiogenic ^{129}Xe excess with $[^{129}Xe]_r/[^{128}Xe]_n$=263. The $(^{80}Kr/^{82}Kr)_n$, is about 2.6, which is very close to the estimated value from the resonance integrals of ^{79}Br and ^{81}Br in the energy range of 30-300 eV [1,2]. Because cosmic-ray exposure age of 10 Ma [1] is in the range for most chondrites and fluence of cosmic-ray produced secondary neutron is in the order of 10^{15} n/cm^2 [2], the high concentrations of halogen-derived isotopes must indicate high concentration of halogens in this meteorite.

Experimental Method: We have reanalyzed noble gases for bulk samples and also measured noble gas micro-distribution using a laser heating technique to confirm the previously reported noble gas data. After that the meteorite was studied using a newly developed experimental apparatus for Ar-Ar and I-Xe dating of meteorites at the Radioisotope Center, University of Tokyo. An ion counting system has been installed to the VG3600 noble gas mass spectrometer. A new small extraction furnace and a laser microprobe enable us to measure noble gases from small samples irradiated by neutrons. Fragments of Yamato 74191 have been measured for I-Xe age. Bjurböle and Allende meteorites were also measured as reference samples.

Results and discussion: Obtained ^{129}Xe*/^{128}Xe* ratios in high temperature extraction steps are 0.68 and 2.23 for Y-74191 and Bjurböle, respectively. The ratio of 2.09 for Allende is similar to that for Bjurböle, indicating almost same formation ages for these meteorites. Contrary to the Allende meteorite, the value for Y-74191 indicates an I-Xe closure time of about 70 Ma later than that of Bjurböle. Very late closure times (>50Ma after Bjurböle) have been reported only for meteorites with high petrologic types (5 and 6) [3,4] Hence, the late closure time of I-Xe system is the first observation for the low petrologic type (L3.6) meteorite. The high concentrations of halogens in Y-74191 might have resulted by an aqueous alteration occurred on its parent body. Mechanism of halogens enrichments and their host phases will be investigated using techniques of SIMS, EPMA and laser microprobe noble gas extraction in the future work.

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