Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SGC51-01 Room:A04 Time:May 24 15:15-15:30

$^{40}Ar/^{39}Ar$ age of Haedean zircon

HYODO, Hironobu[1*] ; SATO, Keiko[2] ; KUMAGAI, Hidenori[2] ; YAMAMOTO, Shinji[3] ; SHIBUYA, Takazo[2] ; KOMIYA, Tsuyoshi[3]

[1]RINS, Okayama Univ. of Sci., [2]JapanAgency for Marine-Earth Science and Technology, [3]Dep. of Earth Science & Astronomy, Univ. of Tokyo

Analyses of ages and closure temperatures using SHRIMP and LA-ICPMS U-Pb system of zircon, K-Ar system of hornblende and micas, and fission track method in zircon and apatite in the same rock sample are the standard techniques in thermochronology. Since zircon has no potassium, it has rarely been used in K-Ar geochronology. After intensive microscopic observation and electron microprobe analyses of Haedean zircons from the Labrador and Acasta gneiss, fine grain muscovite and other minerals as well as fluid inclusions are recognized. The presence of such inclusions suggests a possibility of a secondary event, and it might have caused disturbance in U-Pb system in the zircons, implying the zircons may be older. Utilizing susceptive characteristics of K-Ar system in a secondary hydrothermal event, laser step heating $^{40}Ar/^{39}Ar$ method was applied on the individual zircon grains to investigate the timing of formation of such inclusions in the zircons.

During laser step heating experiment, unirradiated Haedean zircons showed little release of ^{40}Ar below 1000^oC. However, without exception, they released large amount of ^{40}Ar (an order of 10^{-7} ccSTP/g) above 1000^oC in spite of a fact that zircon has no potassium. This suggested that either the zircons have excess argon trapped or a potassium phase. In $^{40}Ar/^{39}Ar$ experiment, the released argon isotopes were approximately 10^{-13} ccSTP (^{39}Ar) and 10^{-10} ccSTP (^{40}Ar) from a grain of 400 microgram. The volume of ^{39}Ar was very small, and the relative error was large. However, one of Labrador zircon gave 4.39 $\pm$ 0.34 Ga at a fusion step after 1000^oC, and the ^{39}Ar fraction was over 70% of the total release. The age could be caused by an excess argon during initial stage of zircon formation or a secondary event. Because of localized nature of excess argon, it tends to produce various ages in the same area rather than a uniform age. The facts that the similar age was observed in another grain, and that the fraction is above 1000^oC suggest that the age may have been preserved since the formation of the zircon. The results from other area will be discussed together.

Keywords: Haedean zircon, $^{40}Ar/^{39}Ar$ age