Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SGL041-08 Room:203 Time:May 25 10:15-10:30

Development of un-irradiated and un-spiked laser fusion K-Ar dating: a trial applied to pyrite single grains

Keiko Sato[1*], Hidenori Kumagai[1], Tadahiro Shibata[2], Hajimu Tamura[1]

[1]JAMSTEC, IFREE, [2]Muroto geopark promotion committee

Laser fusion measurements for a single grain of phenocryst or of in-situ measurement of less-abundant minerals found on thin sections are established for K-Ar dating method. For such kind of samples, Ar-Ar dating is applied widely to obtain radiometric ages because the Ar-Ar method is insensitive to the site difference between K and Ar in the specimen. However, Ar-Ar dating at least raises a difficulty that nuclides produced by irradiation mask some of the original isotope ratios in rock and mineral samples. In the cases of small amount of radiogenic 40Ar, large uncertainty is brought to ages useless by the masking. This motivates us to develop an un-irradiated and un-spiked laser fusion K-Ar dating method, with which we can analyze both Ar and K for the individual grains. This has been tested in following two protocols, which is K measurement following/after laser fusion Ar measurement applied to the retrieved single melted mineral grain itself. Especially, in this protocol, the model of the Hitachi Z-5010, which employs double-beam polarized Zeeman method for background correction, is used. The deuterium lamp and the polarized Zeeman method realize less background in atomic absorption photometry and the new optical system and the improved graphite furnace ensure high sensitivities. This method is expected to enable acquisition of precise radiometric ages of single grain K-Ar dating. Here we report a trial of single pyrite grain analyses from Nobeoka area coupled with multigrain analyses.

Keywords: K-Ar dating, laser fusion, in situ, single grain, un-spiked, un-irradiated