Eu isotope variation in Eu standard materials and geological materials

SEUNG-GU LEE[1*], TSUYOSHI TANAKA[2]

[1]KIGAM, Daejeon 34132, Korea, sgl@kigam.re.kr
[2]Nagoya University, Nagoya 464-8601, Japan, tanakat@nagoya-u.jp

Europium (Eu) is one of the rare earth elements and the shape of Eu abundance normalized by a chondrite is one of the geochemical proxies to understand an evolutin history of the terrestrial and planetary materials. Eu has two stable isotopes (^{151}Eu and ^{153}Eu). Generally, it is known that two isotopes do not show isotopic variation within ε unit [1,2]. However, recent research results indicate a possibility of slight isotopic variation in Eu isotopes [3,4].

In this work, we measured Eu isotopic ratios precisely from the commercial Eu standard solutions and some reference rock materials. For the standard material, we used a commercial pure Eu solution of NIST3117a. The measurement of Eu isotopes was performed Neptune Plus II MC-ICP-MS at Korea Institute of Geoscience and Mineral Resources. Mass discrimination effect on two europium isotopes was externally corrected by the Sm isotopic composition added to the Eu samples (^{150}Sm/^{154}Sm = 0.3244, average value of [5] and [6]) on an exponential law. In our long tests based on the precise measurement and Eu separation technique, we could observe a slight isotopic variation of Eu isotopic ratios in the various Eu standard solutions (0.02‰ to 0.06‰) as well as references rock materials (-0.67‰ to 0.06‰). This variation indicates a possibility of fractionation processes of europium isotopes in the geological system.

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