Comparison of REE tetrad effect using ID-ICP-QMS, conventional ICP-QMS and LA-ICP-QMS Methods

SEUNG-GU LEE¹, TSUYOSHI TANAKA², YOSHIYAKI KON³, TAKAFUMI HIRATA⁴

¹KIGAM, Daejeon 34132, Korea, sgl@kigam.re.kr
²Nagoya University, Nagoya 464-8601, Japan, tanakat@nagoya-u.jp
³AIST, Ibaraki 305-8567, Japan, yoshoyaki-kon@aist.go.jp
⁴University of Tokyo, Tokyo 113-0033, Japan, hrt1@eqchem.s.u-tokyo.ac.jp

Chondrite-normalized REE pattern based on the REE abundance in the terrestrial and extra-terrestrial materials have been used as one of the powerful tools for geochemical and cosmochemical processes. And, the REE tetrad effect with large negative Eu anomaly is one of the representative enigma of the REE geochemistry that was not completely solved in the field of REE geochemistry. High quality data for REE concentration is prerequisite for studying REE tetrad effect from the geological sample.

In this paper, we will report new technique using isotope dilution (ID)-ICP-MS for precise determination of REE abundance in the granite with REE tetrad effect, and then, compared it with conventional ICP-MS and laser ablation ICP-MS data. The isotope spikes used in this study were $^{138}$La, $^{142}$Ce, $^{145}$Nd, $^{146}$Sm, $^{151}$Eu, $^{157}$Gd, $^{163}$Dy, $^{167}$Er, $^{171}$Yb, and $^{176}$Lu.

Our results (Fig. 1) showed that all REE data corresponded well within 5% error range. In addition, we also confirmed that the REE tetrad effect from highly fractionated-granite is one of the specific geochemical phenomena during granitic magma evolution.

![Figure 1. Chondrite-normalized pattern of rare earth element from a highly fractionated granite](image_url)