

## **Geochemical characteristics of granitic rocks underlying ion-adsorption type REE deposits**

K. SANEMATSU<sup>1</sup>, T. EJIMA<sup>1</sup>, Y. KON<sup>1</sup> AND Y. WATANABE<sup>2</sup>

<sup>1</sup>Geological Survey of Japan, AIST, Central 7, 1-1-1 Higashi, Tsukuba 305-8567, Japan. k-sanematsu@aist.go.jp

<sup>2</sup>Mining Museum of Akita University, 28-2 Osawa, Tegata, Akita, 010-8502, Japan.

Geochemical characteristics and constitution minerals of granitic rocks underlying ion-adsorption type rare earth elements (REE) deposits were studied in order to understand the genesis of the heavy REE (HREE)-rich deposits, because they are more critical than light REE (LREE).

The REE grades of the ion-adsorption type deposits range widely from 140 to 6500 ppm in southern China and other countries. The HREE-rich ores are typically low-grades and underlain by fractionated granites characterized by high SiO<sub>2</sub> contents, low P<sub>2</sub>O<sub>5</sub> contents, and the occurrence of muscovite and fine-grained fluorite, because the HREE enrichment and LREE depletion are constrained by fractional crystallization of granitic magma. The REE-rich ores are rich in LREE and the underlying rocks are commonly alkali granites (partially alkaline volcanic rocks), which were likely formed by a low degree of partial melting. Low P<sub>2</sub>O<sub>5</sub> contents are required for the underlying granitic rocks, because the occurrence of monazite-(Ce) and secondary phosphate minerals may inhibit the adsorption of REE during weathering.

REE fluorocarbonates such as synchysite-(Y) and bastnäsite-(Ce) are believed to be the dominant REE sources of ion-exchangeable REE, although a variety of magmatic hydrothermal REE-bearing minerals occur in fractionated granites due to deuteric alteration. In addition, the occurrence of magmatic allanite-(Ce) and titanite has an important role in less fractionated granites, in terms of the sources of ion-exchangeable LREE and HREE, respectively.