

Geochemical characteristics of Jeongju REE deposit in North Korea and Mushgai-Khudag REE deposit in southern Mongolia

**BUM HAN LEE^{1,2}, OTGON-ERDENE DAVAASUREN^{1,2}
AND SANG-MO KOH^{1,2}**

¹Korea Institute of Geoscience and Mineral Resources

²University of Science and Technology (UST)

Presenting Author: leebh@kigam.re.kr

This study presents geochemical analyses of two selected rare earth element (REE) deposits in North Korea and southern Mongolia, located in northeast Asia. As REE is one of the critical minerals, we estimated the potential for REE resources in northeast Asia and selected both deposits for high potential. Jeongju REE deposit is a Paleoproterozoic metasomatic deposit related to the Sakju syenitic intrusives, which were emplaced from 1887 to 1834 Ma. The intrusive body comprises syenite, syenodiorite, and ijolite, and Zr, P, F, and REE minerals are concentrated within the alkali syenite by metasomatism. Major REE minerals in the Jeongju deposit are allanite, monazite, and bastnäesite, while minor REE minerals include thorite, fluorapatite, and xenotime. REE minerals are mostly light REEs enriched while xenotime is heavy REEs enriched. The tectonic discrimination diagram using trace elements suggests the formation environment is within plate granite or oceanic ridge granite. The REE minerals in the Jeongju deposit were recrystallized and reconstituted by epigenetic metasomatism. The Mushgai-Khudag REE deposit is located in the carbonatite bearing alkaline complexes in southern Mongolia, which also include the Lugiin Gol and Ulgii Khiid REE deposits. The REE ore bodies in Mushgai-Khudag deposit are hosted by carbonatites and syenite. Carbonatite and syenite are light REEs enriched. SHRIMP results indicate that carbonatite and syenite in Mushgai-Khudag deposit were emplaced in the early Cretaceous. Hf isotope results demonstrate that juvenile continental crust growth was derived from a depleted mantle source. LA-ICP-MS results of trace elements show that apatite was formed from the carbonatite-silicate magma series. The formation environment of the Mushgai-Khudag deposit is within plate extensional zone. Overall, the geochemical studies of the Jeongju and Mushgai-Khudag REE deposits in northeast Asia suggest their high potential for REE resources, with different formation environments and processes for the two deposits. These results contribute to a better understanding of the geology and mineralization of REE deposits in the region.