

## Mineralogical study of REE minerals in the Higashimatsuura basalt

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The Higashimatsuura basalts distributed in Higashimatsuura-gun Saga Prefecture Japan are divided into five stages from their activity period (Ishibashi, 1971). Three new minerals were reported from the 5th stage of basalt (kimuraite; Nagashima et al., 1986, kozoite-(Nd); Miyawaki et al., 2000, kozoite-(La); Miyawaki et al., 2002). Except the Higashimatsuura basalts, any basalts including rare earth minerals have not been reported in the world. Further it has not yet investigated that a regional distribution of these rare earth minerals and a detailed mineralogical study on these minerals except in type localities.

The purpose of this study is the regional distribution and mineralogy of rare earth minerals in other place of the Higashimatsuura basalts. Specimens were collected at several localities. The 5th stage of the basalt (Mitsukoshi, Kirigo, Niikoba, Urigasaka, Yunoo, Sosorogawachi, Isida, Hayata, Shoubu, Uchiage, Yakataishi, Ura, Ishimuro, Takekoba, Mirukashi) and the 2nd stage of basalt (Hinodematsu, Yokotake, Takashima) were investigated. Their chemical compositions and crystallography were analyzed by X-ray powder diffraction (XRD), scanning electron microscope (SEM) with energy dispersive spectrometer (EDS), transmission electron microscope (TEM), and X-ray microscope.

The main results are as follows:

(1) Calcite, aragonite, kimuraite, kozoite-(Nd), kozoite-(La), lanthanite-(Nd), lokkaite, tengerite and an unknown Ca-Y carbonate were identified as a fissure mineral. The XRD data of the unknown Ca-Y carbonate does not conform to the database of Powder Diffraction File.

(2) The unknown Ca-Y mineral occurs druse or fissure in basalt. It has white color with a vitreous to silky luster and spherical aggregates were made by small plate crystal with perfect cleavage forms. Lokkaite and tengerite are closely associated with the unknown Ca-Y mineral. Major elements are Ca and Y, and the ratio of Ca:Y is almost 1:3 in average. Periodicities of 0.61 nm and 0.93 nm were observed from normal to cleavage plane by TEM. These values are the same as those of tengerite and kimuraite. Also, 3.2 nm periodicity on a parallel with cleavage surface was speculated by XRD data, and it will have alternate layer structure consist of a half of tengerite layer (0.75 nm) and a kimuraite layer (2.4 nm). It is supported by chemical composition (CaY<sub>3</sub>).

(3) The REE minerals were identified in the 2nd stage of Higashimatsuura basalt. Lanthanite-(Nd) occurs in Hinodematsu, and kimuraite and lanthanite-(Nd) occur in Yokotake.