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Geochemical characteristics of Nanzaki Basanite, Izu peninsula, Japan

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We report results of detailed petrological and geochemical analyses carried out for Nanzaki basanite in the southern most part of the Izu peninsula, which locates 50km toward back-arc from the present volcanic front of Izu-Bonin volcanic arc.

Nanzaki volcano erupted 0.43 Ma (Kaneoka et al.,1982). We identified two types of basanitic rock (Massive Lava; Scoria and Layered Lava) based on, composition of phenocryst (Cpx+Olivine) and bulk rock chemistry. Massive lava contains more or less differentiated olivine (Fo=77-90), nepheline micro-phenocryst, and higher Ba/Sr values. FeO∗/MgO value is 0.96-1.08. Scoria and layered lava have primitive composition of olivine (up to Fo=0.91), lower FeO∗/MgO values (0.81-1.01), and lower Ba/Sr values. Other major elements composition shows no clear differences between both magmas (SiO2=42.1-44.5 wt.%, CaO=12.1-13.4 wt.%). Chemical characteristics of scoria and layered lava may indicate character of primary (undifferentiated) magmas generated in the upper mantle.

We also found xenolith in layered lava, which contains clino-pyroxene (>95%), olivine (<5%) and chromian micro-phenocrysts. 0.1-2mm Vugs are observed dominantly. Composition of phenocryst does not distinguishes xenolith from host rock. Although the origin of this xenolith is still unspecified, it was thought to have captured during the upward movement of layered basanite lava.

Both types of rock have same patterns of REE and trace element. Nanzaki basanite is abundant in REE, especially in LREE. It has approximately same value of La/Yb with basanites in SW Japan (e.g. Iwamori, 1992; Tatsumi et al., 1999) and in Hawaii (e.g. T. W. Sisson et al., 2009; 2002). Aoki et al. (1986) suggested that Nanzaki basanite is resemble to alkali basalts in oceanic island tectonic setting. However, there is a significant differences in some elements concentration, such as anomaly in Ba, Sr, Pb and negative anomaly in Rb, K, Zr) recognizable. Such unique magmas could be generated from carbonate-metasomatized mantle in subducting slub tectonic setting.

Keywords: Basanite, Izu-Bonin volcanic arc, major and trace element geochemistry, back-arc rift, ocean island basalt, Sr isotopes