Melt and olivine compositions for picritic dolerite from the Ogi Peninsula, Sado Island, Japan.

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Picrite and picritic basalt are typical in the plume-pluming areas, and sometimes occur in the extensional settings like as rift zone and back-arc basin (Rohnbach, 2004). In the Japanese arcs, distribution of the Cenozoic picritic rocks is restricted to back-arc area, suggesting that they were generated through high degree of melting, relating to back-arc thinning. Otherwise they simply contain large amount of cumulus olivine phenocrysts, due to somewhat effective magma-rising mechanism that commonly works on the back-arc volcanism.

Middle Miocene Shiraki picritic dolerite (Fujibayashi and Sakai, 2003) is one of the back-arc basin picritic rocks, exposing in the Ogi Peninsula, Sado Island, Japan. It intrudes into the boundary between Sawasaki basalt unit of the Ogi Basalt member and lower tuffaceous mudstone of Tsurushi Formations, and has chilled margin at the contact. The chiiled margin has olivine pseudomorph as phenocryst (around 16%) with small spinel inclusion in the glassy matrix with plagioclase laths. The internal body shows flow banding with widely varying size (4.5 - 6.5 mm in maximum) and amount (up to 52 %) of olivine phenocryst, that are intersticially mounted by doleritic-textured groundmass.

Bulk rock analysis revealed that MgO at the rim. The core has higher Fo content and low CaO(0.15 - 0.2 wt.%), and the rim has lower Fo content and high CaO (˜0.2 wt.%). Such lower CaO at the core of olivine phenocrysts is known in the back-arc picrite in the Solomon Islands content of chilled margin was only 10 in weight percent, short to be called as a picrite (MgO ˜12 wt. %), although Banded internal body showed high MgO content up to 30 (wt. %). Major and trace element compositions of the chilled margin are similar to those of the Sawasaki basalt unit. The MORB-normalized trace element patterns are characteristic to P-type MORB. Using FeO/MgO exchange distribution coefficient between melt and coexisting olivine (Roeder and Emslie, 1973), the core (Fo 88) of olivine phenocrysts is in equilibrium with bulk rock chemistry of the chilled margin.

The olivine phenocrysts shows normal zoning(Rohnbach, 2004). They have high Fo and NiO contents than those in the Shiraki picriric dolerite, and are further low in CaO (˜0.15 wt.%). Rohnbach (2004) suggested that those low CaO olivine crystals were derived from source region. However, olivines in Shiraki picritic dolerite may be magmatic, probably crystallized during two stages of crystallization at different pressure conditions.