Preliminary studies on melt inclusions and volatile analysis in basalts recovered from Australian-Antarctic Ridge

YUNSEOK YANG[1,2], JUNG HUN SEO[1] AND SUNG-HYUN PARK[2]

[1]Energy Resource Engineering, Inha University, Korea, zinid@kopri.re.kr

[2]Division of Polar Earth-System Sciences, KOPRI, Korea

Australian-Antarctic Ridge (AAR), located in the south of Tasmania, is extension of eastenmost Southeast Indian Ridge. In January 2013, Korea Polar Research Institute (KOPRI) dredged basaltic rocks from the axis and off-axis seamounts of the AAR using Icebreaker Araon. Collected rock samples contain fine subhedral or anhedral olivine, plagioclase, and pyroxene phenocrysts. Off-axis seamount basalts contain more olivine phenocrysts compared to axis basalts. Olivine phenocryst in the seamount basalt contains many melt inclusions. While some of the olivine contains "homogeneous" glassy melt inclusions, most of the melt inclusions were observed to be internally crystallized. We picked olivine grains containing glassy melt inclusions, and analyzed major elements. The qualitative EPMA spectrum of the melt inclusions show Al, Mg, Si, Ti, Cr, Fe, Ni element peaks. High Mg/Fe ratio of the host olivine suggests high crystallization temperature of the olivine in the basaltic magma.

Quantitative understanding of sulfur and halogen elements in igneous rocks in MOR might give a better insight into the volatile circulation in the Earth's mantle. Qualitative SIMS (Secondary Ion Mass Spectrometry) transient signals demonstrate that the Antarctic KR1 basalts contain sufficient sulfur and halogen elements to be determined. We synthesized homogeneous and halogen-rich basaltic glasses for external Standard Reference Material (SRM). Basalt powder was mixed with compounds such as KI, NaI, $CaCl_2$, KCl, FeS_2, CaF_2, Fe_3O_4, LiBr to produce the halogen and sulfur-rich glass beads. Double polished glass beads were checked for its halogen and sulfur contents, and its homogeneity.