CRYSTAL GROWTH IN SHALLOW MAGMATIC CHAMBER AND ENTRAPMENT OF MELT INCLUSIONS BY PHENOCRYSTALS: BASALTS OF JUAN-DE-FUKA, EAST PACIFIC

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The crystal growth experiments show that a trapping of fluid is a result of interface instability. Supersaturation gradients at interface are of great importance in formation of fluid inclusions in synthetic crystals. Causes of fluid inclusion formation in nature are much more complicated. To investigate melt inclusion entrapment mechanisms we studied plagioclase, olivine and clinopyroxene phenocrystals from Juan-de-Fuka gyalobasalts. Previous studies have shown that crystallization of gyalobasalts began in a shallow magmatic chamber (Sharapov et al, 1998). Our study revealed that plagioclase (An72-86) started to crystallize at temperatures higher than 1200C. Olivine (Fo82-83) and clinopyroxene (Mg#=0.83-0.86) joined to the plagioclase at 1160-1190C. The crystallization occurred at low undercooling which resulted to the appearance of euhedral plagioclase and olivine with scarce single melt inclusions. Nevertheless, the clinopyroxene interface seems to be unstable and were responsible to capture of abundant inclusions. Eruption and melt transport led to tearing off and partial dissolution of olivine and clinopyroxene of crystallized crust of the chamber. Outpooring of lava to ocean floor was accompanied with growth of platelet and rare skeletal plagioclase, and skeletal olivine phenocrystals. These phenocrystals are similar in composition to the earlier ones, but contain abundant melt and fluid inclusions. The compositions of melt inclusion glasses approach those of the groundmass glass. It is suggested that melt inclusion trapping occur at abrupt increase of undercooling. The conservation of inclusions occurred at skeletal growth or regeneration of resorbed surfaces of phenocrystals. This study was supported by RFBR-99-05-64410 and the grant of UIGGM.