Sulfur content of melt inclusions in phenocrysts of the 1707 eruption products of Fuji volcano

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Microprobe analyses of sulfur content were performed for melt inclusions in olivine, orthopyroxene, clinopyroxene and plagioclase phenocrysts of the 1707 eruption products (white pumice and black scoria) of Fuji volcano. Orthopyroxene, clinopyroxene and plagioclase phenocrysts include felsic melts (66-74 wt% SiO2 in white pumice, 62-69 wt% in black scoria) and have crystalline inclusions of magnetite-ilmenite, apatite and Fe-Cu sulfides. Whereas olivine phenocryst traps compositionally distinct mafic melt (SiO2 50-56 wt% SiO2 in white pumice, 52-57 wt% SiO2 in black scoria), and includes fine crystalline phases of Cr-Al spinel, Al-rich clinopyroxene (13 wt% Al2O3), anorthite, apatite and Fe-Cu sulfides. Groundmass glasses are intermediate in compositions between the mafic and felsic melt (63-64 wt% SiO2 in white pumice, 54-59 wt% SiO2 in black scoria). These melt chemistry and mineralogical features suggest that olivine phenocryst was derived from the mafic endmember magma in the magma mixing system (Takahashi et al., 1991). The olivine hosted melt inclusions are expected to provide an important data to investigate the original sulfur concentration of magma.

The melt inclusions in olivine phenocrysts have very variable sulfur contents (50-2000 ppm S in white pumice, 100-1000 ppm in black scoria). The melt inclusions show in many cases hourglass form. Small capillary connecting the trapped melt with the outside of the host phenocryst. The inclusions were depleted in sulfur and chlorine often to be within the microprobe detection limits, by gas exsolution during eruptive ascent. Compared to the hourglass inclusions, enclosed inclusions contain more sulfur, and it is expected that the highest sulfur contents (1000-2000 ppm S) provide us a potential information for original sulfur concentration of primary mafic magma at the source region.