

## Synthesis of single crystals of iron garnet skiaigite ( $\text{Fe}_3\text{Fe}_2\text{Si}_3\text{O}_{12}$ ) and its high-pressure XANES investigation

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Garnets are among the main phases in mantle mineral assemblages and they are always observed as inclusions in natural diamonds. Because of the compositional complexity of natural garnets, the relationships between the composition of mantle garnets and PT-conditions of their formation are still semi-empirical. In this connection, of special importance are investigations of high-pressure components of garnets, namely majorite and skiaigite. Presence of both di- and trivalent iron in skiaigite allows us to consider it an important indicator of the oxidation state in the Earth mantle.

The end-member of Fe garnet was synthesized using 1200-ton Sumitomo multi-anvil hydraulic press. The stoichiometric mixture of  $\text{Fe}_2\text{O}_3$ ,  $\text{FeO}$ ,  $\text{SiO}_2$  powder was loaded into Pt capsule isolated from  $\text{LaCrO}_3$  heaters with  $\text{MgO}$  tubes and enclosed into magnesium oxide ( $\text{MgO}+5\text{wt}\%$ )  $\text{Cr}_2\text{O}_3$  octahedron. Experiment was performed at 9,5 GPa using 18/11 assemblies; heating time was about 10 minutes and temperature around 1337 K.

X-ray-single crystal diffraction was performed at ESRF in Grenoble, France at ID9 beamline and it confirmed purity of crystals and that they are appeared to be single. Garnet was found to be cubic and have space group  $\text{Ia-3d}$ , with the unit cell parameters  $a = 11.728(6) \text{ \AA}$ .

Fe K-edge X-ray absorption near edge structure (XANES) spectra were recorded at the ID24 beamline for single crystals garnet skiaigite and for the pressure up to 61 GPa. The near edge structures are shown in Fig.1. The differences in near edge structure might be due to reduction  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$ .

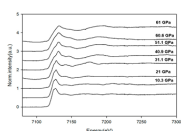


Fig.1. Normalised Fe K-edge XANES spectra of single crystal of iron garnet skiaigite. Individual spectra have been normalized

Further results will be presented at the conference.