| | Experiment title: | Experiment number: |
|---|---|---|
| ESRF | **Sulphur and selenium partitioning between silicate and metallic liquids at core-mantle boundary conditions** | EC 1006 |

| Beamline: | Date of experiment: | Date of report: |
|---|---|---|
| ID27 | from: 14.06.2012 to: 19.06.2012 | |
| **Shifts:** | **Local contact(s)**: | *Received at ESRF:* |
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**Report:**

We studied partitioning of Se between silicate and metallic liquids at very high pressures and high temperatures are reported. Se is considered as geochemical twin of S, i.e. both elements have very similar geochemical properties. Sulphur is a potential light element in the Earth´s core. Unfortunately S cannot be studied in the DAC due to the high absorption of the S fluorescence in the diamonds. Selenium has a higher fluorescence energy and is therefore accessible in the DAC. The experiments have been performed in double-sided laser-heated LDACs at the high-pressure beamline ID27 as described in Petitgirard et al. (2012). Micro-XRF mappings are used to visualise changes of the Se distribution before and after laser heating. Micro-XRD is used to determine the experimental pressure, the onset of melting and

also provides information on distribution of high-pressure / high temperature phases (XRD map). The sample, a thin $Fe_{90}Ni_{10}$ metal foil partly overlapping with a thin Se and S bearing chondritic glass piece, is sandwiched between thin layers of NaCl (Figure 4). The salt acts as pressure media and insulating material. Rhenium or tungsten has been used as gasket materials.

Element distribution maps of Fe and Se after laser heating of experiments at 30 and 60 GPa are shown in Figure 1. In particular at higher pressures Se preferably partitions into the metallic liquid. Six successful experiments have been carried out with pressure ranging between 25 and 60 GPa. Two attempts have been made to reach more than 80 GPa but unfortunately in both experiments diamond cracking caused sudden pressure release.

Element distribution of Sulphur in the samples will be measured ex-situ using an nanoprobe.

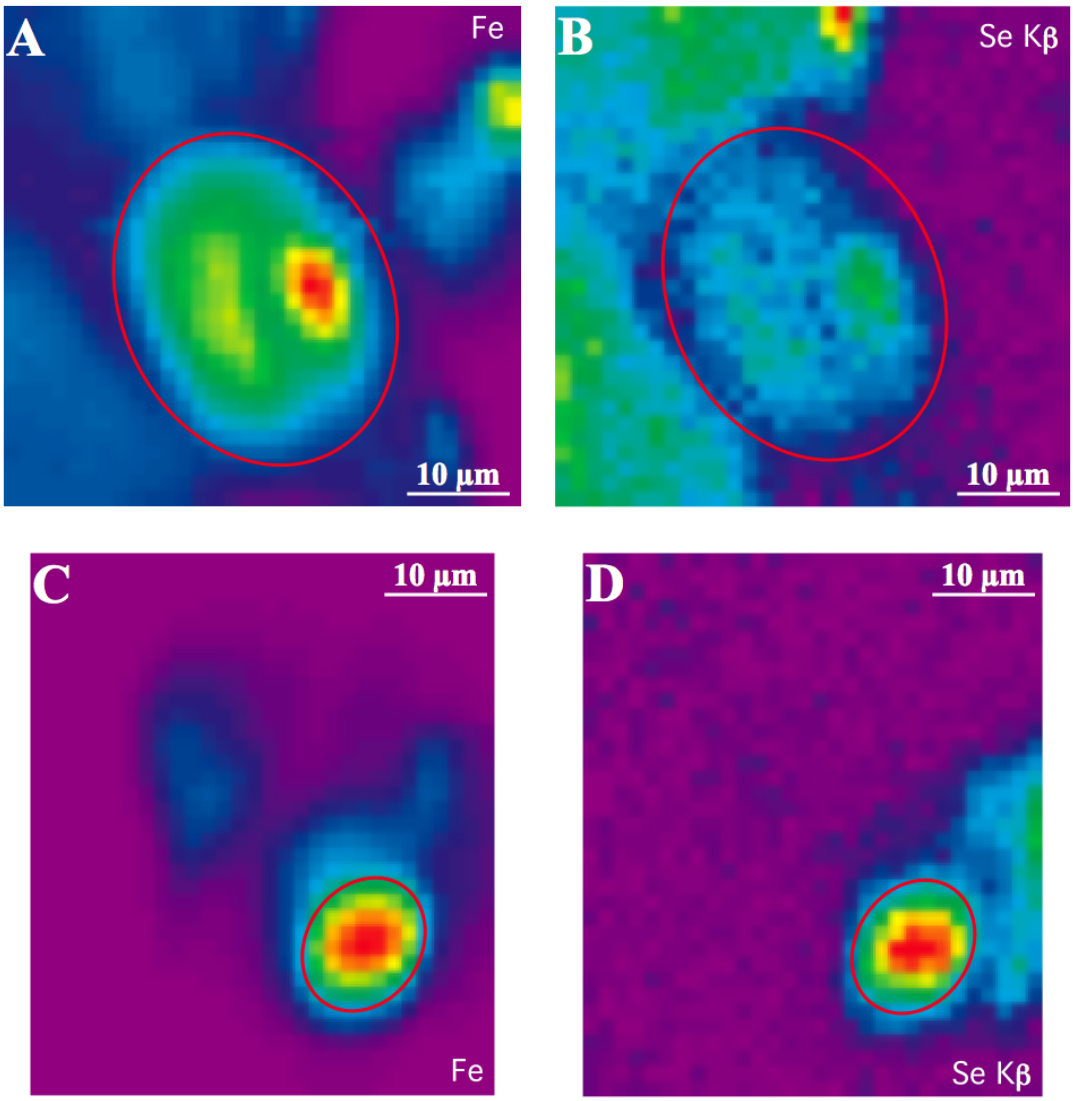


**Fig. 1: Element distribution maps of Fe and Se after laser heating at 30 GPa (Fig. A and B) and 60 GPa (Fig. C and D). Red circles mark the laser heated area.**