| ESRF | **Experiment title:** *Determination of redox state at the 410 km discontinuity* | **Experiment number**: ES-284 |
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| **Beamline**: ID21 | **Date of experiment**: from: 13/05/2015 to: 18/05/2015 | **Date of report**: 10/09/2015 |
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**Report:**

We measured succcessfully at the Fe-K edge, 8 experimental samples that consisted of ol+ opx + gt +/- cpx +/- melt (15 shifts), that were synthesized in the multi-anvil press under various thermodynamic conditions. We also measured several standards for quantification of $Fe^{2+}$ and $Fe^{3+}$ contents (3 shifts). We were able to retrieve the partitioning of $Fe^{3+}$ between the different phases and constrain the distribution of ferric iron upon melting in the upper mantle. **The distribution of ferric iron increases in the order of olivine<orthopyroxene<clinopyroxene<garnet<melt.**

However, we were not able to measure all samples, so **we concentrated on the low-pressure ones**, those made in the olivine stability field (e.g. shallower than the 410 km depth discontinuity). Indeed, due to the high number of phases, high-resolution fluorescence images are required, these are performed by scanning the beam on the sample with a step of less than 1 µm. Hence the complete analysis of one sample takes a little bit less than one day. Also, given the anisotropy of the XANES absorption, several grains have to be analysed for each phase so that a powder-like XANES spectrum is obtained with intensities of the pre-edge that are not biased by preferred orientation. Thus, the small grain size and the statisctics render the analysis time long, which we had underestimated.