ESRF

ESRF	**Experiment title:** Niobium speciation in magmas at high P/T conditions	**Experiment number**: ES127
Beamline: ID24	**Date of experiment**: from: 26/06/2014 to: 01/07/2014	**Date of report**: Feb. 11, 2016
Shifts: 15	**Local contact(s)**: Innokenty Kantor	*Received at ESRF:*

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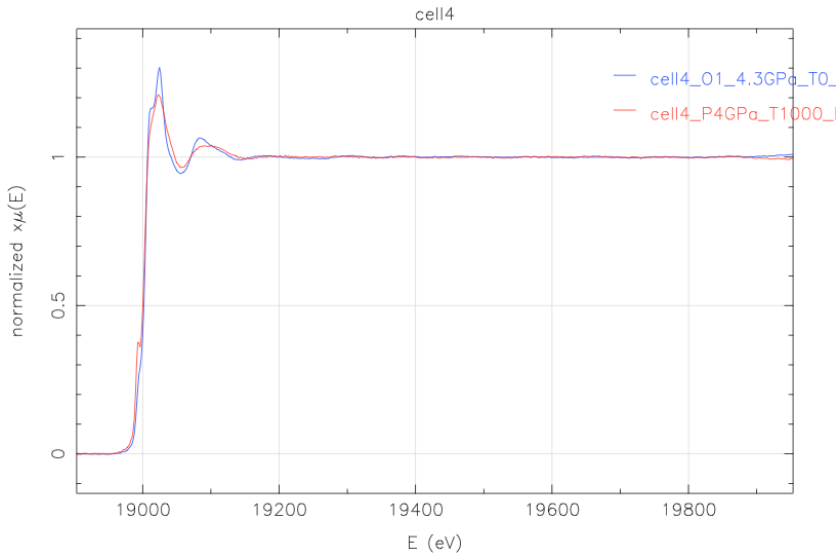
Report:

The aim of this experiment was to characterize the speciation and the structural behaviour of Niobium in silicate melts at high pressure and temperature through EXAFS experiments performed at the Nb K-edge up to 10 GPa in diamond anvil cells.Nb, a high field strength element, is of great geochemical interest due to what is called the “missing niobium”: the ratio of Nb/Ta or Nb/La for the crust, depleted mantle, and ocean island basalts is less than expected for a chondritic Earth.



Nb K edge EXAFS spectra ofNb bearing silicate melt at 4 GPa/room temperature and 4GPa/1000°C

Nb is also highly incompatible in most natural igneous systems. As a trace element, it is thus an important petrogenetic indicator, providing evidence on the magmatic and hydrothermal conditions under which it was fractionated. To date, Nb mineral/metal–silicate partitioning has been modelled assuming Nb^{5+}, however, quenched low pressure experiments are consistent with Nb^{3+}. Changes in oxidation state at pressures cannot be excluded since an increase in the coordination number of Nb could stabilise a reduced valence state. This would help to relate the bulk silicate Earth abundances of Nb to those predicted from metal–silicate partition coefficients. To date, the speciation and local structure of Nb has only been investigated on quenched silicate glasses where it has been shown to occur in the pentavalent state (Nb^{5+}) and in six-fold coordination. Here, we determined the oxidation state and local structure of Nb in silicate melts **at depth by in-situ** high P/T EXAFS measurements perfomed on BM23 beamline using resistive diamond anvil cells equipped with NPD diamonds in order to avoid glitches in the EXAFS spectra usually obtained with single crystal diamonds. The spectra presented on the figures are currently being analyzed.