Supplementary Information:

High-efficiency X-ray emission spectroscopy of cold-compressed Fe_2O_3 and laser-heated pressurized $FeCO_3$ using a von Hámos spectrometer

Christian Albers,[a] Robin Sakrowski,[a] Nicola Thiering,[a] Lélia Libon,[b] Georg Spiekermann,[c] Johannes M. Kaa,[ad] Hlynur Gretarsson,[ef] Martin Sundermann,[ef] Metin Tolan,[g] Max Wilke,[b] and Christian Sternemann[a]

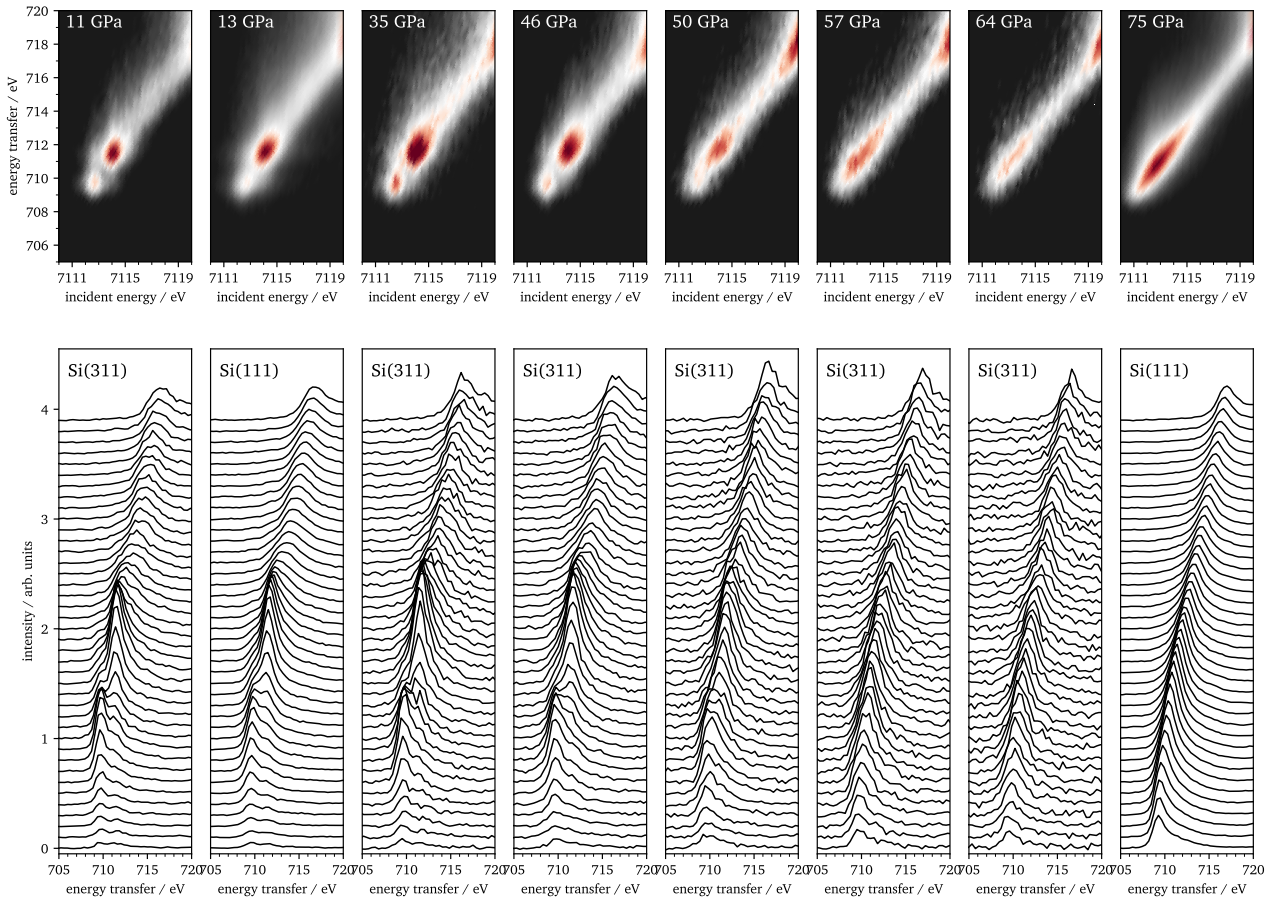

Fig. S1 1s2p maps of Fe_2O_3 for different pressures. 13 GPa and 75 GPa were measured using Si(111) monochromator, while the remaining maps were measured using the Si(311) monochromator which corresponds to an energy resolution of 1.0 eV and 0.2 eV for the incident energy of 7100 eV, respectively.

[a] *Fakultät Physik/DELTA, Technische Universität Dortmund, D-44227 Dortmund, Germany. E-mail christian2.albers@tu-dortmund.de; christian.sternemann@tu-dortmund.de*
[b] *Institut für Geowissenschaften, Universität Potsdam, Potsdam, Germany.*
[c] *Institut für Geochemie und Petrologie, ETH Zürich, Switzerland.*
[d] *European X-Ray Free-Electron Laser Facility GmbH, Holzkoppel 4, 22869 Schenefeld, Germany.*
[e] *Max Planck Institute for Chemical Physics of Solids, 01187 Dresden, Germany.*
[f] *PETRA III, Deutsches Elektronen-Synchrotron (DESY), Notkestraße 85, 22607 Hamburg, Germany.*
[g] *Universität Göttingen, 37073 Göttingen, Germany*

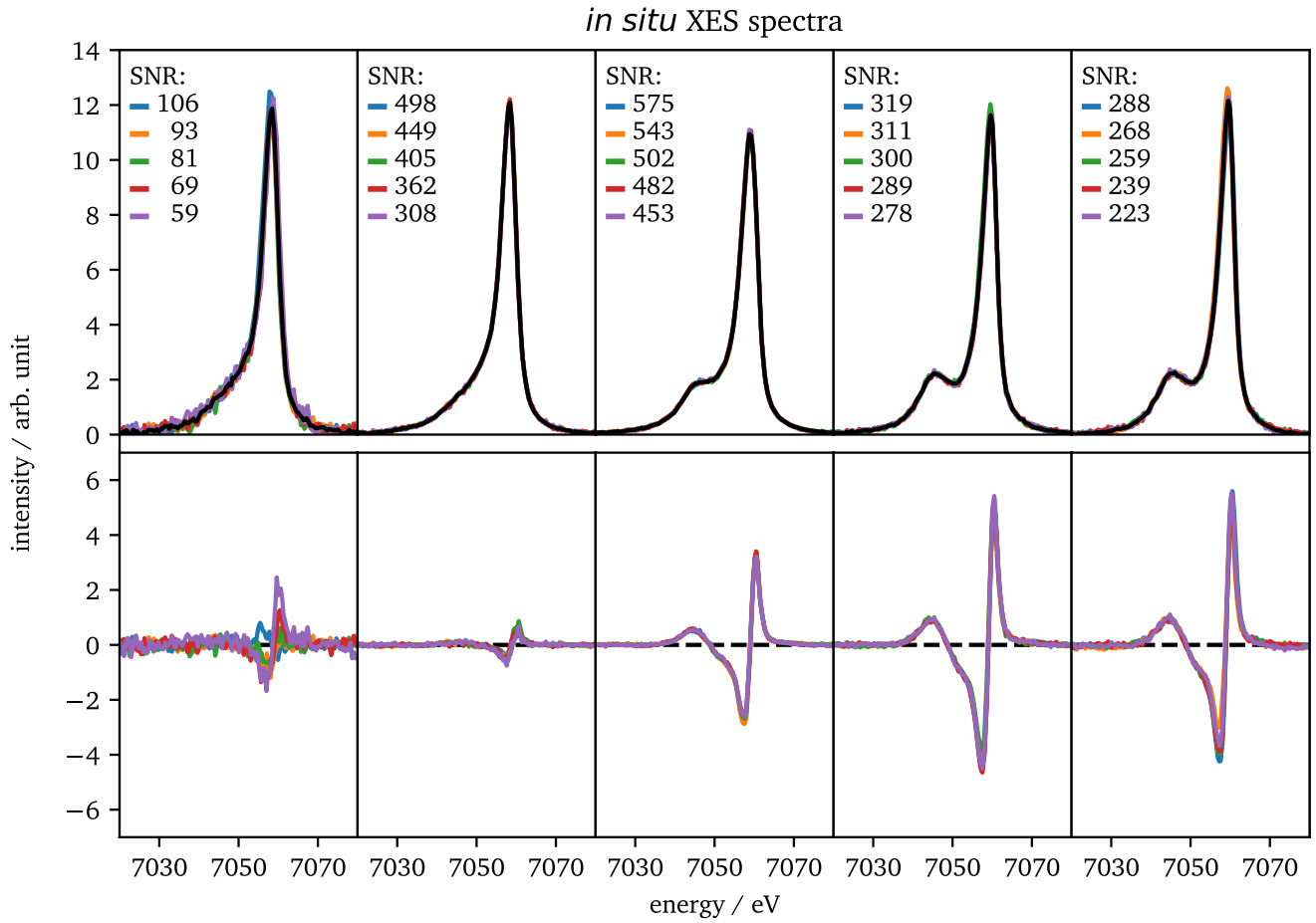

Fig. S2 Each spectrum measured with 1 minute acquisition time corresponding to the results presented in Fig. 3 and Fig. 7 along with its SNR.

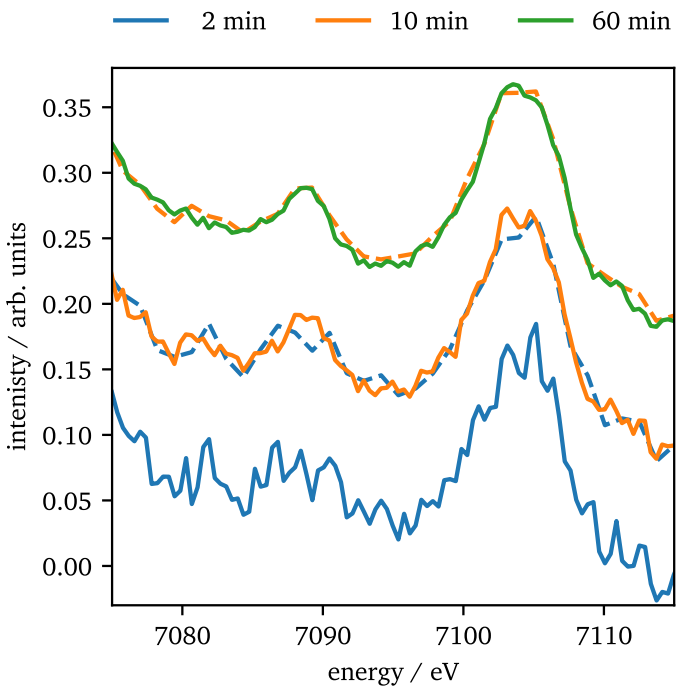

Fig. S3 Vtc spectra of Fe_2O_3 at 75 GPa for different integration times as already shown in Fig. 8 in the manuscript. The spectra shown with dashed lines represent the solid line ones of the same color binned using 3 pixels to increase the SNR. This is an adequate procedure if the width of spectral features is significantly larger than the energy resolution. The energy step size of the original data is $\sim$0.4 eV and increases to $\sim$1.2 eV after binning. The comparison of binned spectra indicate a minimum measurement time of about 10 minutes to achieve a reasonable data quality.