

X-ray Raman scattering spectroscopy

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Non-resonant inelastic X-ray scattering from core electrons or X-ray Raman scattering spectroscopy is an emerging spectroscopic tool to investigate shallow absorption edges, i.e. core electron excitations with binding energies $E_B < 2$ keV, with hard X-rays [1,2]. The use of 5-15 keV X-rays as probe allows investigation of samples contained in complex sample environments, such as in situ chambers and cells and high-pressure/high-temperature vessels, that would render conventional soft X-ray absorption or electron energy loss spectroscopy experiments impossible.

The ESRF hosts one of the most advanced instruments dedicated to X-ray Raman scattering spectroscopy experiments [3]. I will present this unique instrument including recent developments in data analysis. Examples for the use of X-ray Raman scattering spectroscopy for the investigation of disordered materials under extreme conditions and liquids under well defined temperature and pressure conditions will follow.

[1] Schülke, Winfried. *Electron dynamics by inelastic X-ray scattering*. Vol. 7. Oxford University Press, 2007.

[2] Sahle, Ch J., A. Mirone, J. Niskanen, J. Inkinen, M. Krisch, and S. Huotari. "Planning, performing and analyzing X-ray Raman scattering experiments." *Journal of synchrotron radiation* 22, no. 2 (2015): 400-409.

[3] Huotari, S., Ch J. Sahle, Ch Henriquet, A. Al-Zein, K. Martel, L. Simonelli, R. Verbeni et al. "A large-solid-angle X-ray Raman scattering spectrometer at ID20 of the European Synchrotron Radiation Facility." *Journal of synchrotron radiation* 24, no. 2 (2017): 521-530.

