

# Li K edge EXAFS via X-ray Raman spectroscopy

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Lithium is the backbone of today's high-capacity battery technology. As a highly mobile, light, and rather abundant element, it is well suited for an ionic charge carrier for energy storage purposes. Its lightness can also be a complication as its small scattering cross-section and spectral overlap of Li K edge with valence-electron excitations, such as the plasmon, make it an elusive element to study. For example, X-ray absorption fine-structure (XAFS) measurements commonly used to derive the oxidation state and the local environment of an element have limited bulk-sensitivity and are restricted to simple sample environments due to the low energy of the photons. However, in order to gain comprehensive understanding of kinetics of Li in realistic electrochemical situations, *in situ* investigation methods are essential.

X-ray Raman spectroscopy (XRS) is a unique method giving the access to low energy excitations using hard x-rays allowing the study of light elements in complex environments [1-3]. Therefore it is a suitable candidate for *in situ* Li studies [4]. We investigated the utilization of XRS as a practical method to obtain high quality extended X-ray absorption fine structure (EXAFS) of Li K edge at ID20 at multiple momentum transfers from various Li compounds.

## References

- [1] - T.T. Fister et al., AIP Conference Proceedings, **882**, 156 (2007).
- [2] - S. Huotari et al., J. Synchrotron Rad. **19**, 106-113 (2012).
- [3] - Ch. Sahle et al., Proceedings for the National Academy of Sciences **110**, 6301-6306 (2013).
- [4] - T.T. Fister et al., The Journal of Chemical Physics **135**, 224513 (2011).