Poster Presentation

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Crystal wafer as a wavelength monitor

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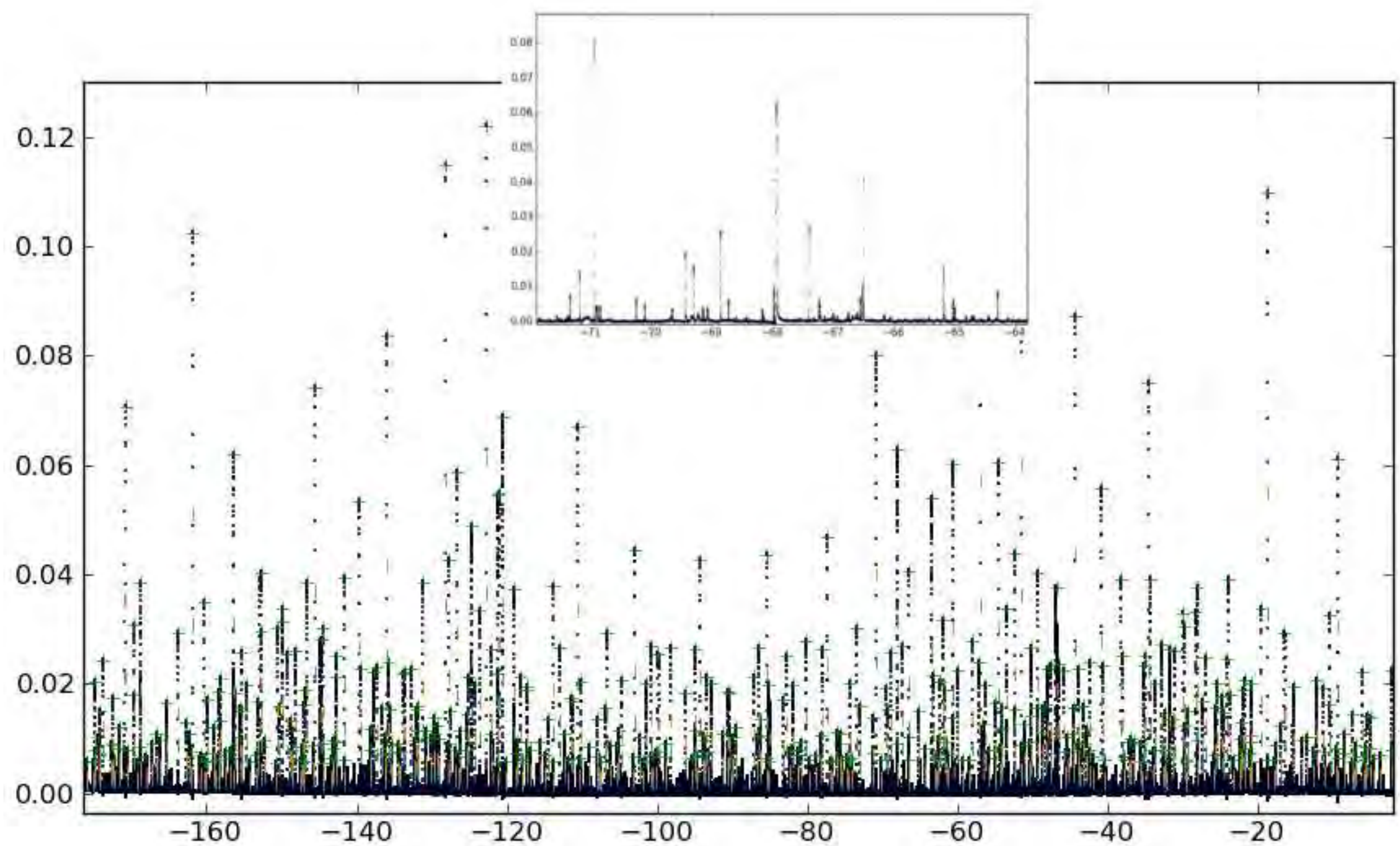
For accurate synchrotron data collection it is important to know the precise X-ray wavelength and to be able to monitor this value. Due to the high heat load on the X-ray optics from modern sources significant drifts may occur. Any change in wavelength is reflected as a change in the unit cell parameters derived from the data and this is especially problematic for measurements of strain. A conceptually simple device has been developed to allow measurements and monitoring of the X-ray wavelength by measuring the transmission of a silicon single crystal wafer in transmission. As the crystal is rotated in the beam different hkl reflections are diffracted leading to a loss of intensity in the transmitted beam. By measuring the incident and transmitted intensity the angles of all of these peaks can be measured with high precision while rotating the crystal, with a setup rather similar to a conventional EXAFS experiment. A similar device has also recently been developed for polychromatic experiments [1]. For high energy X-rays the wafer can be left in the beam throughout the experiment and individual reflections can be scanned to monitor the wavelength as a function of time. The rich diffraction pattern which can be recorded in this geometry should contain a wealth of information as all single rocking curves are measured with high resolution on an absolute scale in comparison to the crystal absorption. The figure shows an example scan collected at 42 keV using a silicon wafer.

[1] *Robach et al, Acta Cryst. (2013). A69, 164-170*



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