Poster Presentation

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In-house energy resolved Laue XRD measurements with a Pilatus detector

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The use of 2D position and energy sensitive hybrid pixel Pilatus detectors allows performing energy-dispersive analysis of Bragg reflections [1]. This significantly improves the classical Laue experiments enabling the unique determination of the crystal lattice and resolving the higher order harmonics. It allows quantitative crystal structure determination using the Laue method without having any priory information about the crystal [2]. Such energy-dispersive Laue diffraction (EDLD) experiments can be performed with a white X-ray beam either from a synchrotron source or from conventional X-ray tubes. The second approach looks less profitable due to its lower irradiation intensity, but this can be compensated considering the better control of white beam spectra by applying different voltage/current settings during the tube operation. Thus, one can efficiently combine the primary beam and XRD measurements using the same Pilatus detector. This allows the implementation of the energy resolved (color Laue) method for any conventional XRD diffractometer equipped with a Pilatus detection system. In the present work EDLD experiments with a conventional X-ray tube were combined with corresponding primary beam measurements using a 300K Pilatus detector tuned for operation within an energy range of 4-25 keV at energy resolution <0.12 keV. Such a combination simplifies several data correction procedures (the spectral intensity distribution, the sample absorption etc.) significantly. Following our developed intensity correction protocols the structure refinement of a reference quartz sample could be achieved with R-factor <0.10. Possible applications of this method (e.g. quantitative XRD studies with stationary crystals) and the details for its further development will be discussed.

[1] *P. Kraft, A. Bergamaschi, Ch. Brönnimann et al, IEEE Trans.Nucl.Sci., 2009, 56(3), 758-764,* ***[2]*** *S. Send, M. von Kozierowski, T. Panzner et al, J.Appl.Cryst., 2009, 42, 1139-1146*

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