The Rocking Curve Imaging method: Visualizing the lattice quality of a crystal

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Rocking Curve Imaging (RCI) is a recently developed X-ray imaging method that combines the advantages of X-ray diffractometry and X-ray topography for characterizing the lattice quality and the distribution of defects in a crystal. The method is instrumentally rather simple, requiring "only" a synchrotron and a CCD camera as essential technical prerequisites. By recording a series of digital topographs along the rocking curve of a crystal, RCI realizes high resolution both in the angular and in the spatial dimension. Originally developed for the inspection of seminconductor wafers, the method has recently been transferred to a variety of other crystalline materials.

RCI seems well suited as a method for characterizing synthetic diamond and for comparing the lattice quality of diamonds grown by different methods, since it can provide both a visual impression of the defect distribution and quantitative measures of lattice homogeneity.

The talk will focus on the basic measuring principle, strategies for data analysis, selected examples of experimental results and a discussion of factors that determine the achievable spatial and angular resolution. Results from the application of RCI to diamond will then be presented in a subsequent lecture.

References
[1] D. Lübbert, T. Baumbach, J. Härtwig, E. Boller, E. Pernot, Nucl. Instr. Meth. B 160, 521 (2000)
[2] P. Mikulik, D. Lübbert, D. Korytar, P. Pernot and T. Baumbach, J.Phys.D 36, A74 (2003)