

## Characterization of HAPG mosaic crystals using synchrotron radiation

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While Highly Oriented Pyrolytic Graphite (HOPG), a mosaic crystal of high integral reflectivity, has been successfully used in different XRF concepts as an effective X-ray focusing monochromator its further development enables new XAFS and XES configurations: Highly annealed pyrolytic graphite (HAPG) is an advanced type of pyrolytic graphite that, as a mosaic crystal, combines high integral reflectivity with a very low mosaicity of typically less than  $0.1^\circ$ . When used as dispersive X-ray optics, a high resolving power has been observed, rendering HAPG very suitable for applications in high-resolution X-ray spectroscopy, which conventionally relies on ideal crystals. For the design and modelling of HAPG crystals in applications requiring high spectral resolution, the diffraction properties must be known very accurately. To close this gap, a comprehensive characterization of HAPG crystals was performed that allows for modelling of the diffraction properties in different diffraction orders over a broad spectral range. The crystal properties under investigation are the mosaic spread, the peak reflectivity and the intrinsic reflection width. The investigations were carried out for different thickness crystal films, which were mounted adhesively on a substrate. It is shown that the diffraction properties are strongly correlated to the grade of adhesion, which depends crucially on the substrate material and its surface properties. The investigations were performed using monochromated tunable synchrotron radiation of high spectral purity with a high-precision experimental setup and calibrated detection devices at the electron storage ring BESSY II.

### References:

- A. Antonov, I. Grigorieva, B. Kanngießer, V. Arkadiev, B. Beckhoff, HOPG-based optics, Handbook of Practical X-Ray Fluorescence Analysis, 1st edition, Springer, Editors: B. Beckhoff, B. Kanngießer, N. Langhoff, R. Wedell, H. Wolff, 143-157 (2006)
- H. Legall, H. Stiel, M. Schnurer, M. Pagels, B. Kanngiesser, M. Muller, B. Beckhoff, I. Grigorieva, A. Antonov, V. Arkadiev, A.Bjeoumikhov, J.Appl.Cryst. 42, 572-579 (2009)
- M. Gerlach, L. Anklamm, A. Antonov, I. Grigorieva, I. Holfelder, B. Kanngießer, H. Legall, W. Malzer, C. Schlesiger and B. Beckhoff, J. Appl. Cryst. 48, 1381-1390 (2015)

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