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Synchrotron topographic studies of stacking faults in type-IIa diamond crystals[1] XIANRONG HUANG, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439; Brookhaven National Laboratory, Upton, NY 11973, ALBERT MACRANDER, JOZEF MAJ, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439 — High-quality diamond is an ideal material for various synchrotron x-ray optical applications. However, diamond crystals generally contain various defects, among which stacking faults (SFs) are more detrimental since they are planar defects extended up to square centimeters. In this presentation, we will introduce monochromatic synchrotron topographic studies of SFs (as well as other defects) in type-IIa diamond crystals. SFs show strong contrast at the tails of the rocking curve, thus broadening the rocking curve width. The outcrops of SFs on the crystal surface still show sharp white-line contrast at the Bragg peak, indicating strong strains or lattice misorientations near the outcrops. From the variation of SF contrast with the rocking angle, we obtain a detailed picture how the extended SFs influence the diffraction performance of diamond crystals. A straightforward diffraction contrast mechanism of SFs will also be presented in addition to the dynamical theory description.

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