Performance of CVD diamond single crystals as side-bounce monochomators in the Laue geometry at high photon energies

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We report on performance of chemical vapor deposited (CVD) single crystal diamond plates of various grades as side bounce monochromators for high photon energies ($\geq$ 20 keV) in the Laue geometry. The diamond crystals were characterized using white beam x-ray topography and double-crystal rocking curve x-ray topography. A 10x enhancement in the integrated reflectivity was observed for selected samples compared to high-quality IIa diamond plates grown by high-pressure high-temperature method. Several crystals were tested in-operando conditions as horizontal side-bounce monochromators at A1 undulator station of Cornell High Energy Synchrotron Source. Wavefront distortions were observed using analyzer based x-ray diffraction imaging. The origins of the wavefront distortions are discussed as well as possible focusing options of the monochromatized radiation. Focusing at a high photon energy (46 keV) is demonstrated using Pt-coated capillary optics.