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High-resolution synchrotron radiation topography characterization of diamond monochromator for hard X-ray free electron laser

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In this paper, the results of high-resolution X-ray topography characterization of monocrystal diamond plate with (100) crystal surface orientation used as high-quality monochromator of high-heat-load free electron lasers are reported. The monocrystal diamond plate was grown using high-pressure high-temperature method and fabricated by laser-cutting. The intrinsic crystal quality of the diamond surface was studied using sequential X-ray diffraction method of synchrotron radiation in weak-dispersive and non-dispersive configuration and the rocking-curve topography of the lattice was obtained. The variations of the rocking-curve width and peak position measured with 7.4 μ m spatial resolution and ~10-7 energy resolution over a 0.5 mm×0.5 mm selected region was found to be less than 0.5 μ rad, which was suitable for applications in wavefront-preserving high-heat-load crystal optics.

Footnotes

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