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Single crystal diamond study with rotating anode x-ray topography YUNCHENG ZHONG, ALBERT MACRANDER, FELIX KRASNICKI, YONG CHU, JOE MAJ, Argonne — Synthetic high-temperature-high-pressure diamond crystals of type Ib having (100) and (111) surface orientations were studied using x-ray topography method. An asymmetrically cut monochromator was applied to expand the x-ray beam from a rotating anode source up to 70mm. Double crystal rocking curve measurements were performed on each crystal and the topography images were taken at each position on rocking curve. The detector is a CCD camera with pixel size of 60 micro meters. The method of comparing rocking curves obtained after azimuthal rotation of the crystal around the reciprocal vector provides the possibility to separate locally the lattice spacing variation (strain) and misorientation (tilt) on the sample. The results show the features on each crystal such as growth sector boundaries and saw scratches. The strain and tilt maps of the growth boundaries can be interpreted as nitrogen aggregation maps. The comparisons of the results from the crystals before and after surface etching show different effects on (111) crystals and (100) crystals. (The type IB crystals in this study were procured from Drukker/Element Six. This work supported by the U.S. DOE, Basic Energy Sciences, under Contract No. W-31-109-ENG-38.)

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