X 線暗視野法光学系の空間解像度向上の試み

Attempt at Improving the Spatial Resolution under X-ray Dark-Field Imaging

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Abstract. X-ray receives X-ray refraction while transmitting soft biological tissue. It is capable of observing breast cancer with high special resolution around 10μm or better by using thin LAA (Laue Angle Analyzer) in XDFI (x-ray dark-field imaging) optics. In an established pathology 5μm thick specimen is observed by visible light microscopy. We focus on thinning LAA plate to see improvement of the spatial resolution. We have reached an idea to control the Borrmann fan such as making the apex angle as small as possible and/or making the bottom line as shorter as possible. In this report we would like to make a report on a preliminary result.

Experiment was performed at BL-14C at Photon Factor at KEK. We used diffraction 440 of silicon crystal at X-ray energy of 35 keV. Fig.1 shows experimental arrangement of X-ray dark field and bright field imaging that is available from LAA. The beam incident onto specimen was prepared by an asymmetric-cut Bragg-case MC (Monochromator Collimator). MC and LAA are in a (+, -) parallel arrangement. We used various thicknesses of LAA (126[2], 170, 550 μm). Data was obtained either by an x-ray film or by a CCD camera that has a pixel size of 3microns.

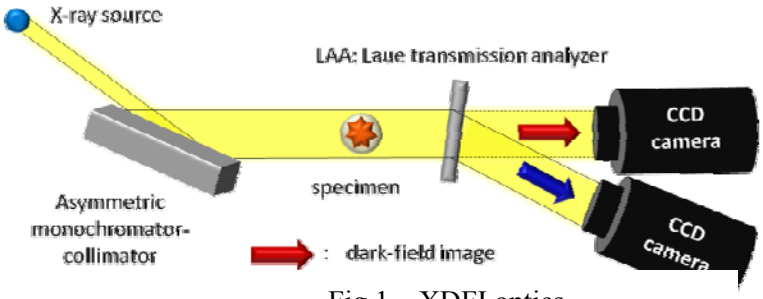

Fig.1 XDFI optics

Fig.2 shows the spatial resolution (both experimental and calculation) in the vertical axis and thickness of LAA. In a nearest future, we look forward to obtaining the spatial resolution in the sub-micrometer region.

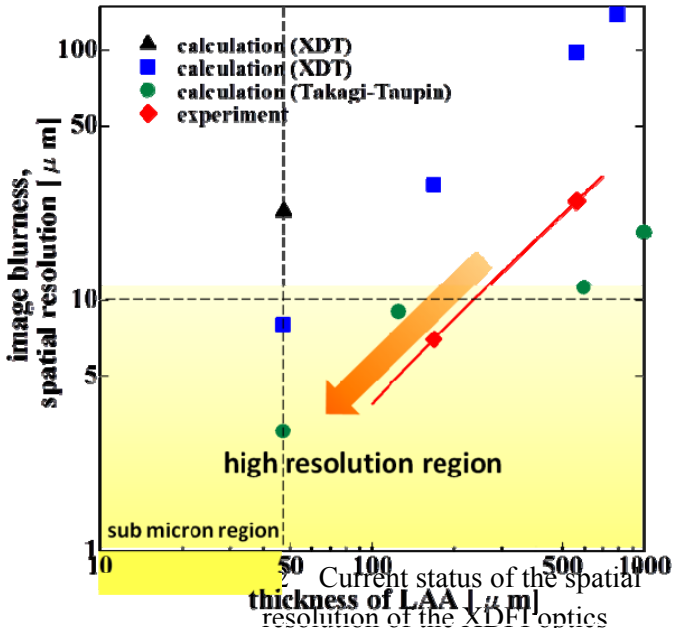

Fig.2 Current status of the spatial resolution of the XDFI optics

Reference.

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[3]T. Suzuki et al., J.A.P. **110** (2011) 084902-1.