

Sub-10nm Focusing of Hard X-Rays by Multilayer Mirror Optics with an On-site Wavefront Correction System

K. Yamauchi^{*,**}

**Department of Precision Science & Technology, Faculty of Engineering, Osaka University,
2-1Yamada-oka, Suita, Osaka 565-0871, Japan*

***Center of Ultraprecision Science & Technology, Faculty of Engineering, Osaka University,
2-1Yamada-oka, Suita, Osaka 565-0871, Japan
E-mail address: yamauchi@prec.eng.osaka-u.ac.jp*

We developed precision fabrication and measurement methods to realize nano-focusing mirror devices for synchrotron radiation hard X-rays [1]-[5]. The fabricated KB mirrors were tested at the 1km-long beamline (BL29-XUL) of SPring-8, and confirmed to realize nearly diffraction-limited focusing with the spot size less than 30nm at 15keV X-ray [6].

In recent research project, we achieved 7 nm focusing of 20keV X-ray by using Pt/C multilayer KB mirrors with an on-site wavefront phase measurement and correction method [7]-[10], [12]. The on-site phase-error measurement is based on a phase retrieval method using precisely measured intensity-profiles near the beam waist. A flat and bendable mirror is placed upstream of the focusing mirror to compensate the wavefront error due to the imperfection of focusing devices. Details of the method [11] will be presented with the latest results achieved in the collaborative research with RIKEN and JASRI of SPring-8.

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