

Principal Researcher	Kazuto Yamauchi			Number of Researchers	5	
Research Institution • Department • Title	Associate Professor, Department of Precision Science and Technology, Graduate School of Engineering, Osaka University			Location of Institution	Suita, Osaka	
Title of Project	Development of hard X-ray nanoscopy/spectroscopy system with probe beam size of 10nm order					
Abstract of Research Project	<p>Third-generation synchrotron radiation facilities enable the materialization of hard X-rays, having both high brilliance and high spatial coherence, and encourage new instrumentations of nanoscopy and/or spectroscopy in many scientific fields such as material, medical and biological sciences. Recently, several research groups of SPring-8 (super photon ring 8GeV), APS (advanced photon source) in USA and ESRF (European synchrotron facility) in France have been attempting to construct high-performance K-B (Kirkpatrick-Baez) mirror optics having high photon flux and no chromatic aberration, in order to realize nanometer-size beams of hard X-rays. In collaboration with the coherent X-ray optics group of SPring-8, we have successfully fabricated the world's first elliptical focusing mirrors having diffraction-limited performances.</p> <p>In this work, we plan to establish a new and more precise fabrication system for ultrahigh accurate X-ray mirror optics, utilizing PCVM (plasma chemical vaporization machining), EEM (elastic emission machining) and MSI (microstitching interferometry) which are highly precise fabrication and surface testing methods originally developed by us in relevant studies. We also plan to construct an X-ray nanoscopy/spectroscopy system with a probe X-ray beam size of 10nm order, which is theoretically minimum in total-reflection mirror optics.</p>					
References	<p>1) Kazuto Yamauchi, Kazuya Yamamura, Hidekazu Mimura, Yasuhisa Sano, Akira Saito, Alexei Souvorov, Makina Yabashi, Kenji Tamasaku, Tetsuya Ishikawa, and Yuzo Mori: Nearly diffraction-limited line focusing of a hard-X-ray beam with an elliptically figured mirror, <i>J. Synchrotron rad.</i>, 9, (2002), pp. 313-316.</p> <p>2) K. Yamauchi, K. Yamamura, H. Mimura, Y. Sano, A. Saito, K. Ueno K. Endo, A. Souvorov, M. Yabashi, K. Tamasaku, T. Ishikawa, and Y. Mori: Microstitching interferometry for x-ray reflective optics, <i>Rev. Sci. Instrum.</i>, 74, (2003), pp. 2894-2898.</p>					
Term of Project	Fiscal years 2003-2007 . (5years)					
Budget Allocation (in thousand of yen)	FY2003	FY2004	FY2005	FY2006	FY2007	TOTAL
	25,000	20,700	14,400	9,700	13,900	83,700
Homepage Address	http://www.prec.eng.osaka-u.ac.jp					