

## Development of Three-Dimensional SPEM at SPring-8 BL07LSU

Koji Horiba<sup>1,2,3</sup>, Satoshi Toyoda<sup>1</sup>, Naoka Nagamura<sup>1</sup>, Hiroshi Kumigashira<sup>1,2,4</sup>, Masaharu Oshima<sup>1,2,3</sup>, Kenta Amemiya<sup>3,5</sup>, Yasunori Senba<sup>6</sup>, and Haruhiko Ohashi<sup>6</sup>

<sup>1</sup>*Graduate School of Engineering, The University of Tokyo, Tokyo 113-8656, JAPAN*

<sup>2</sup>*Synchrotron Radiation Research Organization, The University of Tokyo, Tokyo 113-8656, JAPAN*

<sup>3</sup>*Core Research for Evolutional Science and Technology, Japan Science and Technology Agency (JST-CREST), Tokyo 102-0075, JAPAN*

<sup>4</sup>*Precursory Research for Embryonic Science and Technology, Japan Science and Technology Agency (JST-PRESTO), Kawaguchi 332-0012, Japan*

<sup>5</sup>*Photon Factory, Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK-PF), Tsukuba, 305-0801, JAPAN*

<sup>6</sup>*JASRI / SPring-8, Hyogo 679-5168, JAPAN*

In order to achieve nondestructive observation of three-dimensional spatially resolved electronic structure in solids, we develop a new scanning photoelectron microscope system combined with depth profiling in electron spectroscopy for chemical analysis (ESCA). We call this system “3D nano-ESCA”. For the x-ray focusing optics, a Fresnel zone plate (FZP) is used. The diameter and the outermost zone width of FZP are 200 microns and 35 nanometers, respectively. In order to obtain angular dependence of photoelectron spectra without any sample rotating motion for depth profiling analysis using the maximum entropy method, we select a VG- Scienta R3000 analyzer with an acceptance angle of 60 degrees as a high-resolution angle-resolved electron spectrometer. The system has been installed at a new University of Tokyo Materials Science Outstation beamline BL07LSU of SPring-8. From the results of edge-scan profiles of a gold mesh, we have achieved the total spatial resolution of 92 nm.