IBS CINAP Seminar

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Soft x-ray photoelectron and photoabsorption spectro-microscopes (SPEM & STXM) at the Pohang Light Source

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Abstract

A scanning photoelectron microscope (SPEM) and a scanning transmission x-ray microscope (STXM) have been operational at the Pohang Light Source. SPEM performs x-ray photoelectron spectroscopy (XPS) with focused x-rays of sub-micron size (200 – 1,000 nm diameter at sample). SPEM is a surface sensitive probe (probing depth is less than ~2 nm) and provides local chemical states and electronic structure of specimen. The incident x-ray energy for the SPEM can be chosen from ~400 eV to ~1,000 eV. SPEM application examples on graphene layers, functionalized graphene layers, 2D TMD layers, such as MoS_2, h-BN encapsulated WSe_2, and laser-illumination-induced phase-changed $MoTe_2$ will be introduced.

STXM performs x-ray absorption spectroscopy (XAS) with focused x-rays of tens of nanometer size (30-50 nm diameter at sample) typically in transmission mode. STXM is bulk sensitive and probes local valence states, chemical states, and electronic structure of specimen. X-ray energy range for the STXM is from ~200 eV to ~1600 eV. The functionality of the STXM and application examples on nano-bio materials, nanobubbles, and energy storage materials will be introduced.

Brief Bio

Dr. Hyun-Joon Shin is a chief scientist of Pohang Accelerator Laboratory (PAL), director of Synchrotron R&D Department that contains PLS-II (the 3rd generation synchrotron radiation facility) beamlines and PAL-XFEL (x-ray free-electron-laser facility) beamlines, and an adjunct professor of Physics Department of Pohang University of Science and Technology (POSTECH). Dr. Shin obtained B.S. (1986) and M.S. (1988) in Physics from Seoul National University and PhD (1995) in Physics from POSTECH. He joined the PAL in 1996. Since then, he has constructed, operated, maintained, and user-serviced a scanning photoelectron microscope (SPEM) for space-resolved x-ray photoelectron spectroscopy and a scanning transmission x-ray microscope (STXM) for space-resolved x-ray absorption spectroscopy as well as undulator beamlines for them at the PLS and PLS-II (upgrade version of PLS); 8A1 beamline for SPEM and 10A1 beamline for STXM. He introduced x-ray spectromicroscopy to Korea, and has been developing and expanding spectromicroscopy application field for academy research and industrial application.

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