

Performance Test of the Goniometer for Surface and Interface Analysis

T. Takahashi*, M. Ito¹, Y. Kashiwara², N. Kashiwagura³, S. Nakatani, T. Shimura⁴,
M. Takahashi⁵, M. Yabashi³, W. Yashiro and Y. Yoda⁶

Institute for Solid State Physics, University of Tokyo

¹ Faculty of Science and Technology, Keio University

² SPring-8, Japan Synchrotron Radiation Research Institute

³ Faculty of Engineering, Gifu University

⁴ Faculty of Engineering, Osaka University

⁵ SPring-8, Japan Atomic Energy Research Institute

⁶ Faculty of Engineering, University of Tokyo

A goniometer designed for experiments on surface and interface structure analysis has been installed in the beamline BL09XU. The goniometer is setup in the downstream part of the hutch not to interfere with the instrument for Nuclear Resonant Scattering (NRS) as illustrated in Figure 1. In the proposal, the performance of the goniometer has been studied. The goniometer is basically a four-circle diffractometer with two additional axes for the analyzer. The goniometer is mounted on an adjusting table capable of two-directional translation and a rotation. The rotation works as the fifth rotation axis in five-circle mode within limited angle. The control system developed by the NRS group, based on LabVIEW, has been used to control the goniometer and the counting electronics for experiments on surface and interface structure.

The stability of the beam position for the change of energy was studied. The profile of the incident beam was about 0.5mm(V) x 10mm(H), more spread compared with an expected one in the horizontal direction. The

intense part of the beam, 0.5mm(V) x 1mm(H) in size, was selected from the spread beam by slits. When the wavelength is changed for experiments, the adjustment of the slit position and the center of the goniometer is required.

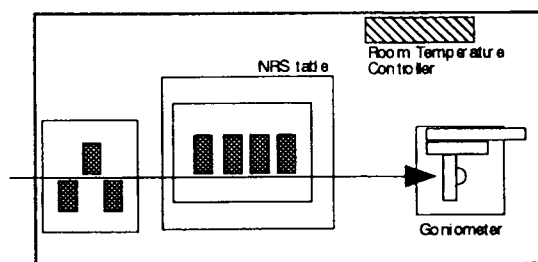


Fig.1: Schematic layout of the goniometer for surface and interface studies in the beamline BL09XU.

The rod scan of silicon samples was done to evaluate the intensity, resolution and signal-to-background ratio of the experimental setup though it was temporal. The intensity was about ten times that of the bending beamline in the Photon Factory for the wavelength of 1.54 Å. With the increase of energy more intensity ratio was obtained.