# Design and Performance of Multilayer Coating on the Blazed Grating in 25 – 80 nm Region

Katsuhiko SAITO [1], Yuzi KONDO [2], Hisatake TAKENAKA [3], Junpei Azuma [4], Kazutoshi TAKAHASHI [4] and Masao KAMADA [4]

[1] *Venture Business Laboratory, Saga University, 1 Honjo, Saga 840-8502, Japan*
[2] *Akita Research Institute of Advanced Technology, 4-21 Sanuki, Araya, Akita 010-1623, Japan.*
[3] *NTT-AT Co., 162 Shirakata, Tokai, Ibaraki 319-1193, Japan*
[4] *Synchrotron Light Application Center, Saga University, 1 Honjo, Saga 840-8502, Japan*

A new beam line for high-resolution angle-resolved photoemission study on solids and surfaces has been constructed at BL13 of the Saga Light Source, which is the first synchrotron light facility in Kyushu Island. In order to realize high resolution, high energy reproducibility and wide energy rage, the monochromator is composed of the combination of grazing incidence and normal incident mounts. The grazing incident mount has two varied line spacing plane gratings and three spherical mirrors, while the normal incidence mount involves a plane grating and a spherical mirror. It is found that resolving power better than 10,000 and photon flux of $10^{10}$–$10^{12}$ photon/sec can be obtained from ray-tracing calculations. To cover the energy gap between the grazing and normal incident mounts, the multilayer-coating on the plane grating has been designed and the performance was examined.

The multilayer-coated grating was designed for the 25–80 nm regions. As the grating substrate, a gold-coated blazed plane grating with 1200 grooves/mm (Spectra-Physics) was selected. Its nominal blaze angle and blaze wavelength are 1° and 29 nm, respectively. Three different multilayer, i.e. SiC/Mg multilayer, $Y_2O_3$/Mg multilayer and SiC-coated $Y_2O_3$/Mg multilayer, were coated on each third of the grating by magnetron sputtering. The SiC/Mg multilayer is expected to have a sharp peak around 26 nm, while the $Y_2O_3$/Mg multilayer covers broad region from 27 to 80 nm. The SiC-coated $Y_2O_3$/Mg multilayer has high reflectivity in long wavelength region more than 45 nm. The SiC coating is also expected to be strong for heat load. The absolute efficiencies of the +1 order diffraction were measured in a constant deviation configuration (deviation angle: 15°) at BL5B of UVSOR facility, IMS, OKAZAKI.