Mapping of chemical bond states of Ag/Si(111) with synchrotron orbital radiation photo emission electron microscope

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The attempt to obtain the chemical bond states mapping (XPS microscope image) has been done in SR facilities all over the world with SR-XPEEM. However it is not easy to obtain the XPS image for the inner shell photoelectron because the signal intensity is so weak.

The chemical bond XPS imaging carried out at SPring-8(BL17SU) is shown in the present study. Fig.1 shows a LEEM image of Ag on the Si(111) surface. (1) and (2) are as for the Ag island, (3) is 2D region with $\sqrt{3}\times\sqrt{3}$ structure. The local area XPS spectra of Ag 3d were obtained as shown in Fig.2, and the chimerical shift between 3D and 2D areas can be recognized. Moreover, the XPEEM image of Ag was obtained as shown in Fig.3. This XPEEM image is taken at the peak of the XPS spectrum for 3D island. There fore 3D island is bright and 2D area is dark. Fig.4 shows intensities of the XPEEM image measured in 2D and 3D areas as a function of thekinetic energy of photoelectrons. The chemical shift (0.5eV) was also observed.

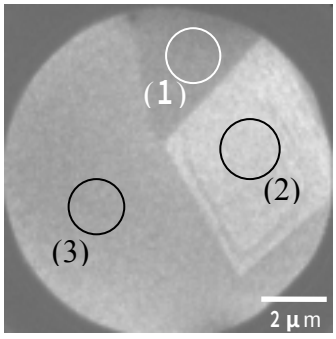

Fig1 LEEM image

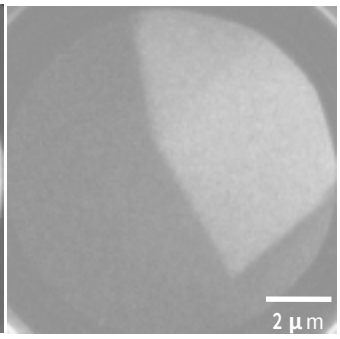

Fig3 XPEEM image

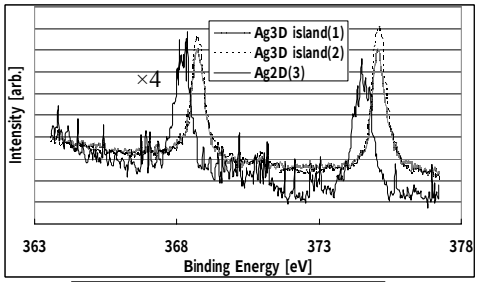

Fig.2 XPS spectra of Ag

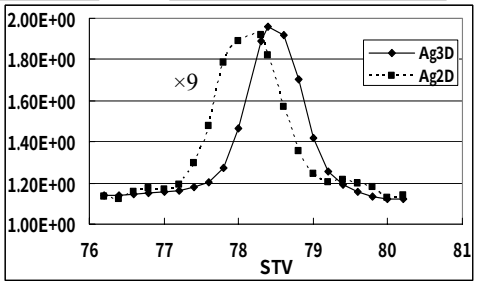

Fig4 XPEEM intensity change