

## Multi-scale surface and interface measurement system for soft-material films at SPring-8.

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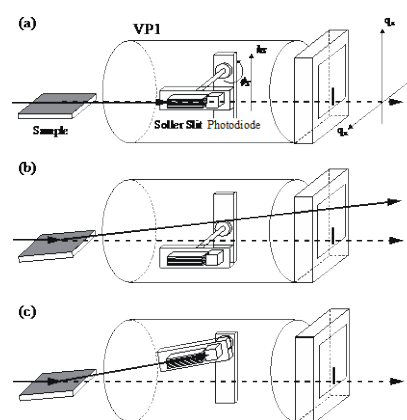
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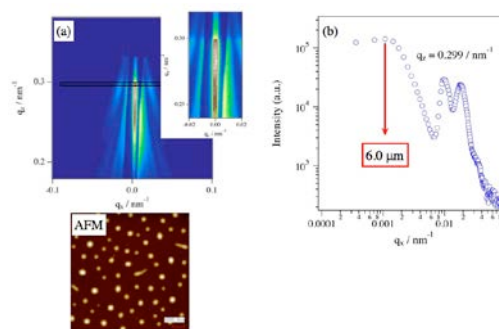
A new experimental system has been launched by coupling with the measurement techniques, which include grazing incidence small/wide angle X-ray scattering (GISWAXS) and grazing incidence X-ray diffraction (GIXD), as well as X-ray reflectivity (XR), at the BL03XU beamline of SPring-8 [1].

In the GISWAXS and GIXD experiments, the incident beam impinges under a very shallow angle around  $0.1^\circ$  onto the sample surface. Therefore, precise collimation of the incident X-ray beam in the direction parallel to the sample surface is required. For a precise and quick sample setting, a new soller slit and the PIN-photodiode system are installed in the vacuum path (Figure 1 (a)). In the GISWAXS measurement, this system can avert from the direct beam and the X-ray scattering from the sample as shown in Figure 1 (b). Furthermore, by using this system, a quick method of specular reflectivity becomes possible with the GISAXS measurement. Figure 1 (c) also shows the schematic view of a quick XR measurement with this soller slit system.

In addition to the GISWAXS/GIXD/XR compatible system, a linkage arrangement of the vacuum path in the first hutch and the second hutch achieved the extremely long camera length about 11.7 m as a smart grazing-incidence ultra small-angle X-ray scattering (GIUSAXS) measurement system using the detecting system installed in the second hutch. Figure 2 (a) show the scattering patterns from the dewetted polymer blend thin films. The in-plane profile at the Yoneda line indicated that the small angle resolution could reach to  $6.0 \mu\text{m}$  in the real space, which is corresponding to the correlation length of the dewetted structures (Figure2 (b)).



**Fig. 1.** Sketch for the position of the soller slit and PIN-photodiode system in the VP1 for (a) the sample alignment, (b) the GISAXS measurement and (c) the quick XR measurement.



**Fig. 2.** 2D GIUSAXS pattern (a) and in-plane profile (b) of dewetted polystyrene /poly vinyl mether ether blend film at the wavelength of  $0.1 \text{ nm}^{-1}$ .