

Resonant Soft X-Ray Scattering Measurements for Liquid-Crystal Materials

UVSOR Synchrotron Facility
Division of Advanced Photochemistry



IWAYAMA, Hiroshi
Assistant Professor

We study soft matters such as liquid-crystal materials with soft x-ray, whose energy region covers K-edge energies of carbon, nitrogen and oxygen. Soft matters exhibit their intriguing properties due to mesoscopic physical structures by self-organizations. To understand properties of soft matters, we need to investigate their structure in the mesoscopic scale.

1. Development of Resonant Soft X-Ray Scattering Measurements

Resonant soft x-ray scattering measurements can probe mesoscopic structures and periodic spatial variations of the

orientation of molecules with both elemental and chemical environment sensitivity and have orders of magnitude scattering intensity enhancement over conventional small angle (non-resonant) x-ray scattering, which is sensitive only to the electron density modulations.

In this year, we developed an equipment for resonant soft x-ray scattering measurements. Since soft x-rays are strongly absorbed by air, all soft x-ray paths should be in high vacuum. In addition, a thickness of sample must be less than 1 micrometer to obtain transmitted scattered lights.

We were successful in developing the equipment and now confirmed vacuum test and sample holder test. Our equipment can probe structures in the range from 62 Å to 170 Å. A first sample will be liquid-crystal materials which show a twisted structure. The experiments will be performed at BL3U of UVSOR in September 2020.