



Contribution ID: 503

Type: not specified

## Current Status of NanoTerasu BL02U: beamline for ultrahigh resolution resonant X-ray inelastic scattering

Wednesday 28 August 2024 17:45 (15 minutes)

NanoTerasu BL02U is an ultrahigh energy resolution resonant inelastic soft X-ray scattering (RIXS) beamline. Construction of the beamline started in January 2023 and was completed by September 2023. Construction of the RIXS spectrometer began in October 2023 and was completed by February 2024. Commissioning will start from April 2024 and be open for users from 2025. This beamline is dedicated to a “2D-RIXS spectrometer”, utilizing the energy-dispersive X-ray from the beamline [1]. The designed total energy resolution (combined energy resolution of the beamline and RIXS spectrometer) is sub-10 meV ( $E/\Delta E > 100,000$ ) in the energy range of 500 to 1000 eV. Ongoing development and improvements to the facility are planned to gradually work towards achieving this challenging ultimate goal.

Figure 1 shows a photograph of the constructed beamline and RIXS spectrometer. The beamline is equipped with a vertically dispersing focusing varied-line-spacing plane-grating monochromator with an entrance slit. The sample is placed where an exit slit would typically be installed in a conventional beamline, allowing the vertically dispersed X-rays from the monochromator to directly irradiate the sample. Incident X-ray is horizontally focused by a Wolter mirror just before the sample. Scattered X-ray is vertically imaged by another Wolter mirror to keep the energy information of the incident X-rays. The energy of the scattered X-rays is horizontally resolved, and the energies of both the incident and scattered X-rays are obtained two-dimensionally on the detector. In the presentation, we will provide an overview and report on the current status of BL02U.

[1] J. Miyawaki et al., J. Phys.: Conf. Ser. 2380, 012030 (2022).

### I plan to submit also conference proceedings

Yes

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**Presenter:** MIYAWAKI, Jun

**Session Classification:** Mikrosymposium 5/1: Operando Investigations

**Track Classification:** 5. Diffraction and scattering for operando investigations