Preface

This Activity Report covers scientific and technological activities carried out using the UVSOR-III Synchrotron in FY2021 (April 2021 - March 2022). We present scientific examples of how the users study at the UVSOR Synchrotron Facility.

The present UVSOR-III Synchrotron is one of the most advanced low-energy SR facilities of the 3rd generation SR in the world and is now one of the critical resources to accelerate the investigation of molecular science. The UVSOR-III Synchrotron has a small electron storage ring but has powerful 6-undulator beamlines (3 VUV and 3 in-vacuum soft X-ray undulators) with 8-dipole beamlines. We continue improving and upgrading our micro- and nano-scale photoabsorption and photoemission approaches and in situ/operando measurements in the IR, VUV, and soft X-ray regions, based on our strategic international collaboration program in molecular science. We are grateful to all the people who use our facility and support our efforts.

UVSOR operates for 40 weeks/year (ca. 2,200 h user time for 36 weeks), accepts ~230 proposals, about ~600 individual researchers counting total ~5,000 people*day/year. Most users stay for one or two weeks for experimenting. To continue high-level achievements in science and technology at the UVSOR-III Synchrotron, our in-house staff is constantly committed to maintaining and improving high-performance accelerators and beamlines.

In terms of personnel, Assitant professor, K. Sugita left UVSOR. The support technical staff, T. Horigome retired, who has been dedicated manufacturing and equipment development for a long time since the early days of UVSOR. A senior researcher, beamline scientist, T. Araki joined to UVSOR from January 2022. He will promote life science and biology field using BL4U and BL3U.

On the experimental side, technological development never stops, hence we will make a progress on the operando and/or imaging-related techniques to inspire advanced molecular science. We have started to construct the new endstation at the undulator-based soft X-ray beamline BL6U since 2020. The new instrumentation of the photoelectron momentum microscope (PMM) is developing and you may find the final whole picture of the apparatus in FY2022, which consists of a double-hemispherical analyzer with spin detector. In FY2023, it will be connected to another beamline BL7U for doing normal-incident geometry experiments. In the beamline BL1U, we have conducted in developing the novel light sources, including novel experiments using twin-Undulator configuration to demonstrate atto-second interference experiments. The advanced SR-related instrument will offer opportunities in characterizing the electronic structure of surface atomic sites, thin films, molecular adsorbates, bulk crystals, and so on.

We have discussed to construct the post-UVSOR-III as a long-term plan for sustainable development since 2019. The idea would partly be seen in the IOP journal we submitted, a special issue of Electron Structure. We look forward to receiving your feedback and suggestions on the continuing evolution of the UVSOR Synchrotron Facility. In the FY2023, the UVSOR conglutinates the 40th-year ceremony, hence the cover design of Activity Report is revised as a memorial issue of 50th. We hope many users will perform excellent work by fully utilizing the UVSOR-III Synchrotron as a unique international hub for the SR research in advanced molecular science.

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Satoshi Kera
Director of the UVSOR Synchrotron Facility