Preface

This Activity Report reviews the scientific and technological work carried out using the UVSOR-III Synchrotron in FY2024 (April 2024 – March 2025). We present examples of research conducted by users at the UVSOR Synchrotron Facility. The selection policy for the important results in each field has changed. A new chapter "Highlight" has been created, and the reports have been brought together with the aim of increasing their visibility beyond the research field.

The UVSOR-III Synchrotron is one of the world's leading third-generation, low-energy SR facilities and serves as a critical resource for advancing molecular science. Although its electron storage ring is compact, it supports six undulator beamlines (three VUV and three in-vacuum soft X-ray) alongside seven dipole beamlines. Through our strategic international collaboration program, we continue to enhance micro- and nano-scale photoabsorption and photoemission techniques—as well as in situ/operando measurements—in the IR, VUV, and soft X-ray regions. A feasibility study is also under way to develop instrumentation tailored to complex, inhomogeneous samples, including biology and life science systems. The issue of low beam current during 200 mA operation is expected to be resolved by maintenance at the end of FY2024.

UVSOR operates 40 weeks per year (approximately 2,200 h of user time over 36 weeks), accepts around 230 proposals annually, and supports about 500 individual researchers—totaling roughly 5,000 user-days per year. Most users conduct experiments over one- or two-week visits. To sustain high-level achievements, our in-house staff remains dedicated to maintaining and improving high-performance accelerators and beamlines.

On the experimental front, technological development never pauses. We are advancing operando and imaging-related techniques to drive breakthroughs in molecular science. Since 2020, we have been constructing a new end-station at the undulator-based soft X-ray beamline BL6U, featuring a photoelectron momentum microscope (PMM) equipped with a double-hemispherical analyzer and a 2D spin detector. This article summarizes the current status of that instrumentation. At beamline BL1U, we have been developing novel light sources—most notably twin-undulator configurations for attosecond interference experiments. These advanced SR-related instruments will expand opportunities to characterize the electronic structure of surface atomic sites, thin films, molecular adsorbates, bulk crystals, and more.

Since 2019, we have also been planning Post-UVSOR-III as a long-term strategy for sustainable development (see our dedicated website for UVSOR-IV*). Several workshops have been held to discuss future perspectives, and we welcome your feedback and suggestions on the facility's continued evolution. We look forward to the many excellent studies users will carry out at UVSOR-III, and to its role as a unique international hub for advanced molecular-science research.

*"Website"

May 2025
Satoshi Kera
Director of the UVSOR Synchrotron Facility