

Instrument Center

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Instrument Center was organized in April of 2007 by integrating the general-purpose and state-of-the-art facilities of Research Center for Molecular Scale Nanoscience and Laser Research Center for Molecular Science. The mission of Instrument Center is to support the in-house and external researchers in the field of molecular science, who intend to conduct their researches by utilizing general-purpose and state-of-the-art instruments. The staffs of Instrument Center maintain the best conditions of the measurement apparatuses, and provide consultation for how to use them.

The main instruments the Center now maintains in Yamate campus are: Nuclear magnetic resonance (NMR) spectrometers (JNM-ECA 600 repaired in 2022–2023 and JNM-ECZL 600 installed in 2023 for solutions, and JNM-ECS400 for solutions), matrix assisted laser desorption/ionization time-of-flight (MALDI TOF) mass spectrometer (microflex LRF, Bruker Daltonics), ESI-TOF mass spectrometer (Bruker Daltonics, maXis), powder X-ray diffractometer (Rigaku RINT-Ultima III), molecular structure analysis using crystalline sponge method (Rigaku SuperNova), circular dichroism (CD) spectrometer (JASCO J-1500), differential scanning calorimeter (MicroCal VP-DSC), isothermal titration calorimeter (MicroCal PEAQ-iTC & iTC200), scanning electron microscope (SEM; JEOL JSM-6700F), elemental analyzer (J-Science Lab Micro Corder JM10), and ICP atomic emission spectroscopy (Agilent 5110 ICP-OES).

In the Myodaiji campus, the following instruments are installed: Electron spin resonance (ESR) spectrometers (Bruker E580 installed in 2022, E680, E500, EMX Plus, ns pulsed laser for time resolved experiments), NMR spectrometer (Bruker AVANCE600 for solids), superconducting quantum interference devices (SQUID; Quantum Design MPMS-7, MPMS-XL7, and MPMS-3 installed in 2022), solid-state calorimeter (Rigaku DSC8231/TG-DTA8122), solution X-ray diffractometer (Rigaku

NANO-Viewer), single crystal X-ray diffractometers (Rigaku Mercury CCD-1, CCD2, RAXIS IV, and Rigaku HyPix-AFC), operando multipurpose x-ray diffraction for powder and thin films (Panalytical Empyrean), thermal analysis instruments (Rigaku DSC8231/TG-DTA8122), fluorescence spectrometer (SPEX Fluorolog), UV-VIS-NIR spectrometer (Shimadzu UV-3600Plus), Absolute PL quantum yield measurement (Hamamatsu Photonics Quantaaurus-QY C11347-01), Raman microscope (Renishaw INVIA REFLEX 532), picosecond tunable laser system (Spectra Physics Tsunami and Quantronix Titan/Light Conversion TOPAS), low vacuum analytical SEM (Hitachi SU6600), field emission transmission electron microscope (JEOL JEM-2100F), angle resolved ultraviolet photoelectron spectroscopy (ARUPS) for functional band structures (Scienta-Omicron DA30), FTIR spectrometer (Bruker IFS 66v/S), two sets of *operando* scanning probe microscopes (Bruker Dimension XR Icon Nanoelectrical & Nanoelectrochemical), and electron spectrometers for chemical analysis (ESCA) equipment (Scienta-Omicron, R4000L1).

In the fiscal year of 2022, Instrument Center accepted 101 applications from outside and the total user time amounted 1,615 days for outside and 1,276 days for in-house. Instrument Center also maintains helium liquefiers in the both campus and provides liquid helium to users (51,198 L/year). Liquid nitrogen is also provided as general coolants used in many laboratories in the Institute (41,816 L/year).

Instrument Center also organizes the Inter-University Network for Common Utilization of Research Equipments, the Molecule and Material Synthesis Platform in the Nanotechnology Platform Program (FY2012–2021), and the ARIM (Advanced Research Infrastructure for Materials and Nanotechnology in Japan) Program (FY2021–2030) supported by Ministry of Education, Culture, Sports, Science and Technology. These special programs are described in the other chapter of the booklet.