Comprehensive Analysis Center

CAC Users' Guide

SANKEN
大阪大学 産業科学研究所

Comprehensive Analysis Center

SANKEN

Contents

1. Introduction

Material Analysis Center (MAC), the predecessor of Comprehensive Analysis Center (CAC), had been established in 1977 as an affiliated facility of SANKEN. CAC, with the reorganization of MAC integrating the former Electron Microscope Room, was established in 2009 as a common comprehensive facility to support a wide range of basic and applied research fields in SANKEN. CAC staffs consist of 1 associate and 2 assistant professors (as full-time professors), 5 technical staffs, 1 specially appointed researcher, 1 part-time staffs, 1 associate professors (concurrent post), 3 assistant professors (concurrent post) and 1 director (concurrent post).

Fortunately, immediately after the renewal, CAC could update many of decrepit instruments to globally advanced instruments by obtaining a supplementary budget in 2010 to be equipped with observation instruments including component and surface analyzers, spectrometers and electron microscopes, shown in this booklet, to comprehend various research fields in SANKEN. The instruments are maintained and managed by CAC staffs to allow users to utilize at any time. CAC staffs support analyses by utilizing instruments required expertise and each researcher can utilize easily operable instruments all day. Lectures for instrument users, including instrumental analysis lectures for new students, is vigorously held every year. Fully utilize the instruments in CAC if you read this booklet and/or CAC users' guide.

CAC is a SANKEN-affiliated common facility and primarily positioned as a research support facility in SANKEN. Additionally, CAC enhances cooperation with collaborative research facility networks centering on Core Facility Center, Osaka University. CAC users consisting of intramural and extramural researchers and Incubation Building-located company workers are currently increasing. CAC was highly evaluated by external evaluations held in 2012 as "an open facility which is a model case in Japan and Osaka University should be proud of".

All CAC staffs make further efforts to effectively utilize the expenditure to allow all users to give excellent research results. The CAC full-time professors conduct their original research related to organic, organometallic and analytical chemistry by fully utilizing instruments in CAC. Additionally, CAC staffs vigorously participate in opening CAC to the public (Icho Festival), tours for high school students and introduction activity of advanced instruments and research.

CAC staffs would appreciate the understanding and cooperation of all users' for maintenance and development.

2. Staff List

Position	Name	Affilation	Extension	E-mail	Room No Annex of Research Buildings
Director	Yutaka Ie	Department of Soft Nanomaterials	8475	yutakaie*1	F514
Associate Prof.	Takeyuki Suzuki	Comprehensive Analysis Center (CAC)	8525	suzuki-t*1	205-1
Assistant Prof.	Dayang Zhou	Comprehensive Analysis Center (CAC)	8526	zhou*1	206
Assistant Prof.	Kaori Asano	Comprehensive Analysis Center (CAC)	8527	asano*1	206
Associate Prof.	Mitsuko Nishino	Department of Biomolecular Science and Regulation	8548	mnishino*1	F341
Assistant Prof.	Yoshifumi Kondo	Department of Advanced Hard Materials	8436	y.kondo*1	S605
Assistant Prof.	Yasunobu yamashita	Department of Complex Molecular Chemistry	8471	yyamashita*1	F527
Assistant Prof.	Soichi Yokoyama	Department of Soft Nanomaterials	8476	yokoyama.soichi*1	F506
Technical Staff	Tsuyoshi Matsuzaki	Technical Division	8527	matuzaki*1	302
Technical Staff	Hitoshi Haneoka	Technical Division	8526	haneoka*1	206
Technical Staff	Yosuke Murakami	Technical Division	8531	murakami*1	S105
Technical Staff	Tsunayoshi Takehara	Technical Division	8528	takehara*1	206
Technical Staff	Takuya Yamanaka	Technical Division	6510	t-yamanaka*1	S506
Technical Staff	Nao Eguchi	Core Facility Center	4782	eguchi-n*2	I405
Specially Appointed Researcher	Kinya Katano	Core Facility Center	8526	katano.kinya.sci*3	206
Specially Appointed Technical staff	Takeshi Hirano	Core Facility Center	4815	hirano-ta*2	I405
Specially Appointed Assistant Prof.	Yusuke Ohnishi	Core Facility Center	4815	ohnishi.yusuke.corefc*3	I405
Specially Appointed Researcher	Ming-Chun Hsieh	Flexible 3D System Integration Lab	4295	hsieh*1	S115
Assistant Administrative Staff	Tomoko Wada	Comprehensive Analysis Center (CAC)	8529	cac-secretary*1	201

*1)@sanken.osaka-u.ac.jp *2) @office.osaka-u.ac.jp *3) @osaka-u.ac.jp

3. Instrument List

Instrument Name		Model (Maker) Name	Measurement Method		For Self Measurement			Installation Room ＊2	Details	Staff
			Request	Self	Special Guidance	Reservation	Overtime Utilization ＊1			
Nuclear Magnetic Resonance	700 MHz	AVANCEIII-700 (BRUKER)	○			Available	Available	105	6	D. Zhou H. Haneoka
	600 MHz	AVANCEIII-600 (BRUKER)	○					104	6	
	600 MHz	ECA-600 (JEOL)	○	○	Required			106	7	
	400 MHz	ECS-400(JEOL)		○	Required			F428	7	Y.Yamashita
	400 MHz	ECS-400(JEOL)		○	Required			F507	7	S.Yokoyama
Mass Spectrometer		JMS-700(JEOL)		○	Required	Available	Available	303	8	K. Asano T. Matsuzaki
		DART-AccuTOF-Express(JEOL)		○	Required	Available	Available	303	8	
		Ultraflex III(BRUKER)		○	Required	Available	Available	304	9	
		micrOTOF II (BRUKER)	Negotiable					304	9	
		LTQ Orbitrap XL(THERMO)	○					304	10	
		ITQ1100(THERMO)		○	Required	Available	Available	302	10	
Secondary Ion Mass Spectrometer		M6(IONTOF)		○	Required	Available	Available	102	11	N. Eguchi
Infrared Spectrophotometer		FT/IR4100(JASCO)		○	Required	Available	Available	302	11	T.Suzuki H. Haneoka
		React-IR45(METTLER)	Negotiable	○		Available	Available	302	12	
Ultraviolet-visible Spectrophotometer		V-770(JASCO)		○	Required	Available	Available	302	12	
Polarimeter		P-2300(JASCO)		○	Required	Available	Available	302	13	
Circular Dichroism spectrometer		J-1500(JASCO)		○	Required	Available	Available	302	13	
Inductively Coupled Plasma Spectrometer		ICPS-8100(SHIMADZU)	○	○	Required	Available	Available	301	14	N. Eguchi T.Hirano H. Haneoka
CHN Element Analyzer		JM10(J-SCIENCS)	○					302	14	T. Matsuzaki
Differential Thermal Balance		TG8120(RIGAKU)		○	Required	Available	Available	302	15	T. Takehara
Differential Scanning Calorimeter		DSC8270(RIGAKU)		○	Required	Available	Available	302	15	
		DSC8230(RIGAKU)		○	Required	Available	Available	302	15	

Instrument Name	Model (Maker) Name	Measurement Method		For Self Measurement			Installation Room ＊2	Details	Staff
		Request	Self	Special Guidance	Reservation	Overtime Utilization ＊1			
Scanning Electron Microscope	JSM-F100(JEOL)	○	○	Required	Available	Available	S107	15	Y.Murakami
Transmission Electron Microscope	JEM-ARM200F(JEOL)	○					S104	16	M.Nishino Y.Murakami
	JEM-2100(JEOL)(HC)	○	○	Required	Available	Negotiable	F192	16	
	JEM-2100(JEOL)(HR)	○	○	Required	Available	Negotiable	S113	—	Y.Murakami M.Hsieh
Focused ion beam	FB-2100(JEOL)		○		Available		S113	19	
Nanoscale Hybrid Microscope	VN-8010(Keyence)		○	Required	Available	Available	S107	—	Y. Murakami
X-ray Photoelectron Spectroscopy	KRATOS ULTRA2 (SHIMADZU)	○	○	Required	Available	Available	101	17	H. Haneoka K.Katano
X-ray Diffractometer	SmartLab(RIGAKU)	＊3 ○	○	Required	Available	Available	101	17	T. Takehara
X-ray fluorescence	ZSX100e(RIGAKU)		○	Required	Available	Available	101	18	Y.Kondo
X-ray Diffractometer for Single Crystals	XtaLAB PRO(RIGAKU)	○	○	Required	Available	Available	203	18	T. Takehara
Microcrystal Electron Diffractometer	XtaLAB Synergy-ED (JEOL-RIGAKU)	○					102	19	Y. Ohnishi Y. Murakami T. Takehara

＊1 “Overtime Utilization” means utilization of CAC expect 8:30-18:00 on weekdays.(See p.22 for details)

＊2 See Floor Map (p.30)

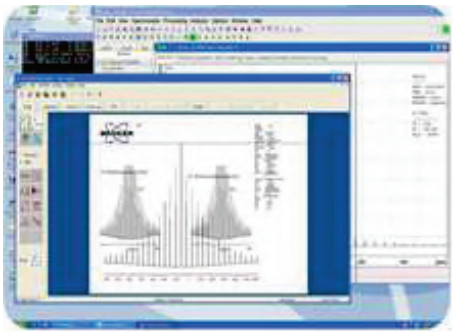
＊3 We only accept particular measurements.

4. Summary of Instruments

Nuclear Magnetic Resonance NMR 700MHz

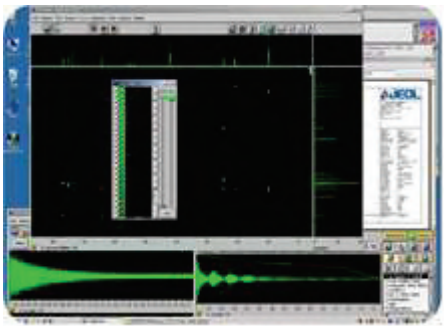
AVANCE III 700, NMR spectrometer of Bruker BioSpin, is an advanced digital NMR device at the high level. Combination of cryoprobes enables supersensitive NMR measurement. The spectrometer has supersensitive triple resonance probes for ^{1}H, ^{13}C and ^{15}N, which optimizes ^{1}H and ^{13}C nuclear measurements, enables high sensitive and rapid 2D and 3D measurements, and remarkably shortens measurement time. The spectrometer has automatic tuning/matching functions and enables fully automatic measurement with rapid and high resolution by simultaneously using sample changers, which is applicable to the various fields including pharmaceutics, biotechnology, chemistry, material science etc.

Nuclear Magnetic Resonance NMR 600MHz(solid)



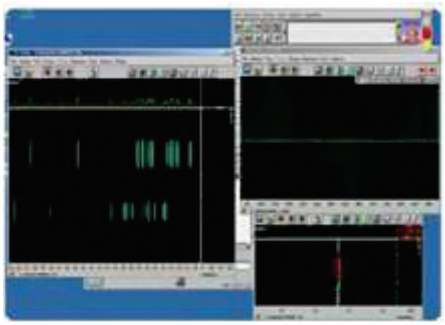
AVANCE III 600WB, solid NMR spectrometer of Bruker BioSpin, has a wide bore magnet, which enables measurement at -140～+150°C. Combination of 4mm CPMAS probes and superhigh speed rotary 1.3mm CPMAS probes enables proton, multinuclear and 2D NMR measurements difficult for conventional spectrometers. The solid NMR spectrometer at the high level is applicable to the various fields including material science, life science and determination of solid catalysts.

Nuclear Magnetic Resonance NMR600MHz



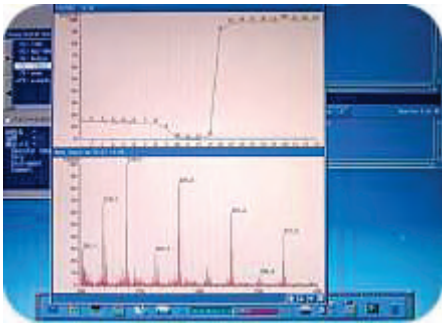
JNM-ECA 600 (JEOL), is an FT-NMR spectrometer using the advance digital technology and high frequency. Automatic tuning and matching enables gradient shim. The spectrometer easily provides NMR spectra with high reproducibility and quality. The water signal elimination and differential spectrum measurements are also easily measurable. Low frequency probes are also equipped. The spectrometer is applicable to rhodium element and has an MICCS instrument enabling reaction tracing measurement.

Nuclear Magnetic Resonance Spectrometer 400MHzNMR



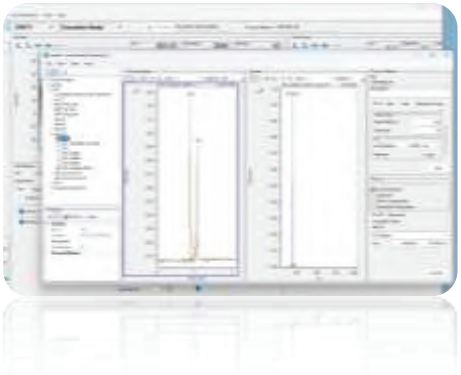
Two high performance magnetic resonance spectrometers (JNM-ECS 400), have the spectrometer originally equipped with auto-tuning probes which enable to cleanly, quickly and easily measure various NMR spectra. The spectrometers are equipped with data processing software Delta which enables to easily and freely process data. Users also can process NMR data by using analytical software such as Delta, Net Alice etc. through theirs PC in the ISIR.

Mass Spectrometer FAB-MS (JMS-700)



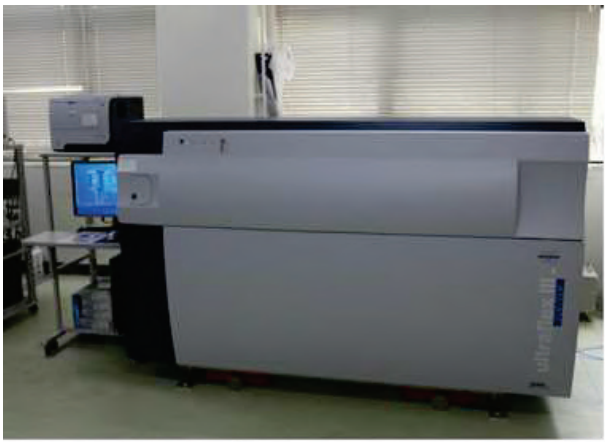
This JMS-700, developed by JEOL, is the reverse geometry (BE geometry) double-focusing mass spectrometer of the magnetic field preceding type by which the ion optics system consists of a magnetic field and an electric field. That's the successor model of forward geometry (EB geometry) analyzer JMS-600H, and that can tune parameters about condition automatically. Chemical composition can be presumed because of its good-sensitivity and high resolution.

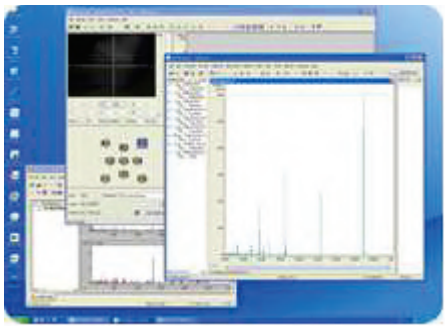
Mass Spectrometer DART-MS



This mass spectrometer has a dedicated DART (Direct Analysis in Real Time) ion source attached to a high-resolution time-of-flight mass spectrometer. The DART ion source is a novel ion source and applicable to samples under atmospheric pressure and at ground potential, which enables contactless and rapid analysis. The spectrometer is applicable to liquids and solids. Instantaneous measurability of samples without any pre-treatments of the surface of the samples is characteristic of the spectrometer. The spectrometer is effective for screening and high-throughput analysis.

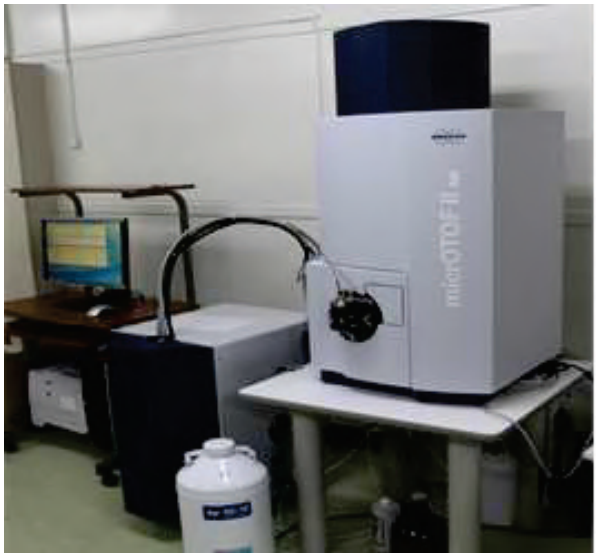
Mass Spectrometer MALDI-MS

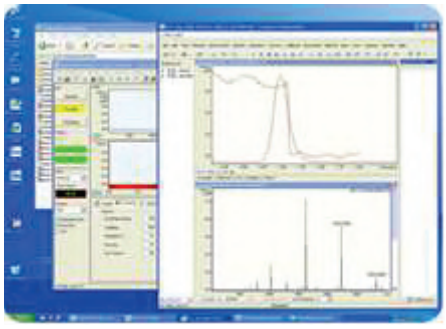




Ultraflex III, developed by BRUKER, has smartbeam as a laser beam to largely enhance sensitivity and resolution. The focal point size (10μm~80μm) of the laser is controllable by PC. Applying minimal laser focuses to samples enables to scan sample regions with very high pixel resolution, very high sensitivity and very high resolution by MARDI imaging experimental instrument. The spectrometer exhibits a wide mass range of 1 - 500,000 and high resolution of 25,000 by using PAN (Panoramic) technology.

Mass Spectrometer CSI-MS



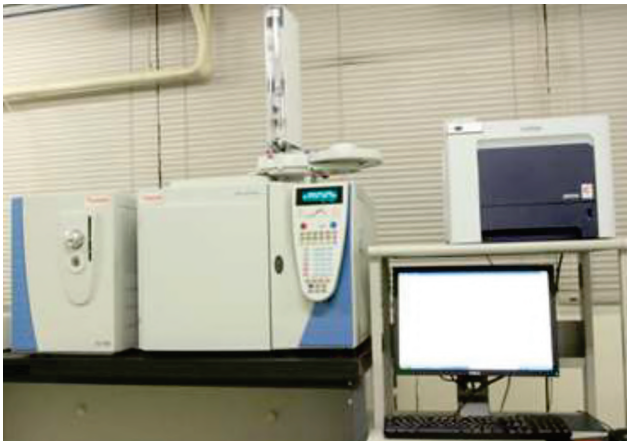


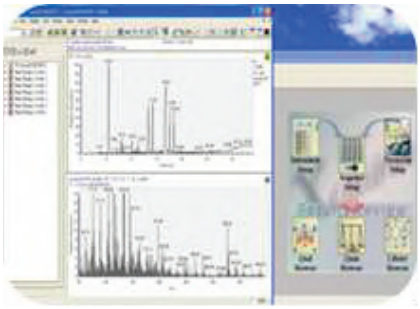
This spectrometer has a cryogenic ion source (CryoSpray) with micrOTOF II (mass accuracy: 1-2 ppm, mass resolution: 16,500 and measurable mass range: 50~20,000 m/z), which enables CryoSpray-TOF-MS measurement and measurement under cooled ionization conditions. The spectrometer is suitable for samples with unstable at room temperature: organometallic complexes, supramolecular complexes and reactive intermediates etc.

Mass Spectrometer FT-MS

This hybrid electric field Fourier-transform mass spectrometer (FT-MS) has Orbitrap and high speed and high sensitive LTQ XL equipped with linear ion trap. The spectrometer has high performances with high resolution (100,000 of resolution) and accuracy (3 ppm), which enables not only structural analysis of low molecules but also identification of complicated proteins by multistep MS/MS. Accelerating scanning speed and shortening a cycle time enable a very short measurement time of a few to 5 minutes per sample. ESI, APCI and APPI ionizations are selectable and a wide range of samples is measurable at the highest level.

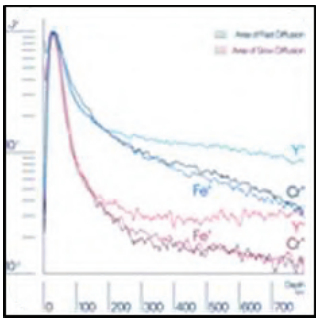
Mass Spectrometer GC-MS





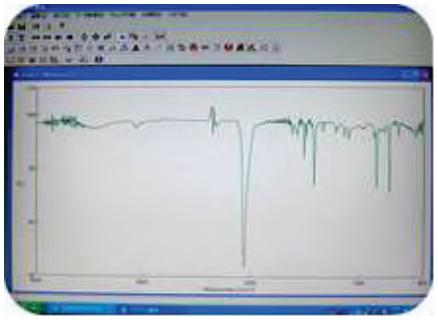
A member of the Thermo Fisher Scientific ITQ™ Series of GC-ion trap mass spectrometers, the ITQ 1100™ GC/MS^n (measurable mass range: 10-1100 m/z) enables MS^n (MS/MS, $n \leq 5$). The ITQ 1100 has new advanced scan-function of "ACE (Automated Collision Energy) and PQD (Pulsed Q Dissociation Mode)". The advantages of its functions are easier to optimize analysis and data quality is improved. It acquires full scan and MS^n data in a single acquisition simultaneously. ITQ 1100 restores the performance without venting by using the standard vacuum probe interlock.

Time of flight secondary ion mass spectrometer TOF-SIMS



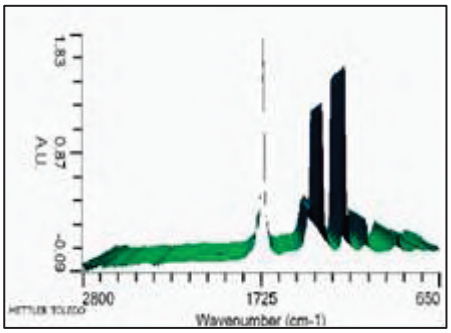
TOF-SIMS irradiates the sample surface with an accelerated ion beam and detects the generated secondary ions with a time-of-flight mass spectrometer. Unlike dynamic SIMS, TOF-SIMS can perform surface analysis using pulsed ions. Since this device is equipped with a spatter gun, it is possible to perform depth direction analysis while spattering materials. It is possible to obtain MS spectra and depth profiles for all elements and molecules. In addition, since it has excellent spatial resolution compared to other surface analysis, it is possible to analyze minute areas and perform MS imaging.

Fourier Transformation Infrared Spectrophotometer FT-IR



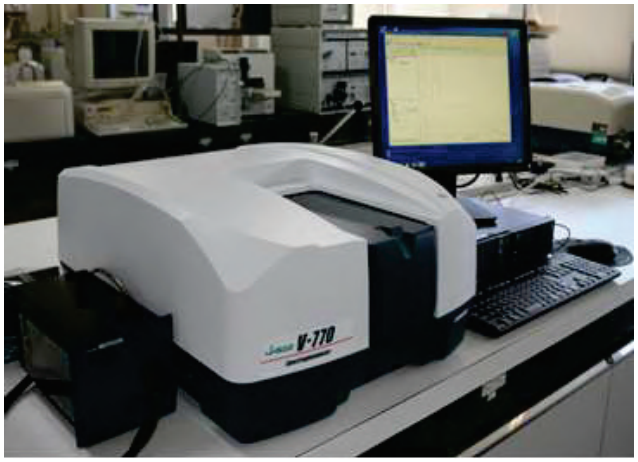
This compact infrared spectrophotometer Fourier-transforms interference waves by PC, which has high sensitivity, stability and easy operability and is suitable for routine analysis. The spectrophotometer has ATR (Attenuated Total Reflection) measuring instrument, which is applicable to film and powder samples. The spectrophotometer enables middle, near and far infrared measurements, which afford infrared absorption spectra from a wide range of both inorganic and organic samples. Furthermore, the spectrophotometer is applicable to rapid scanning and imaging measurements, which enables to utilize for research and material development.

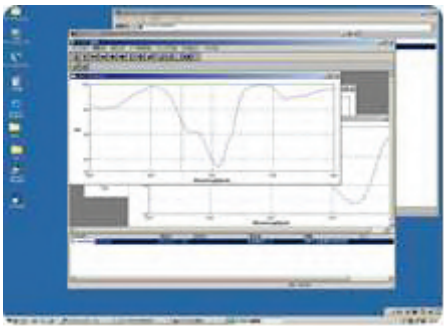
Infrared Spectrometer React IR



This spectrometer enables continuous measurement for the shortest time of every 5 seconds, which continuously monitor various changes in a solution by showing infrared spectra. The spectrometer is effective for analysis of reaction mechanisms due to identifiability of reaction intermediates existing only during chemical reactions and observability of the extinction rate of starting materials and the formation rate of products from changes of peak intensities.

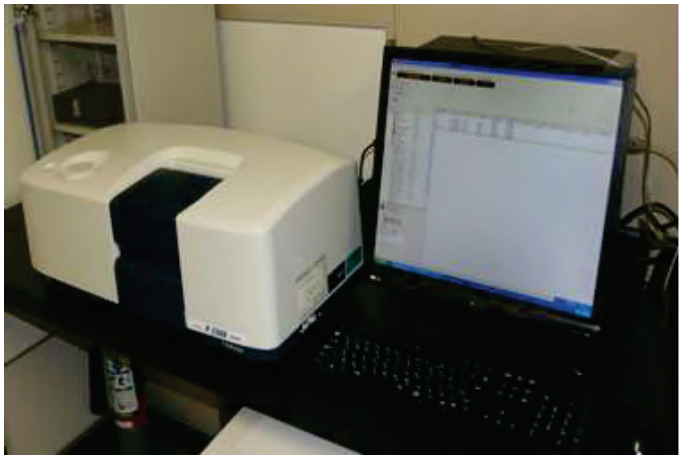
Ultraviolet-visible Near Infrared Spectrophotometer UV・Vis・NIR

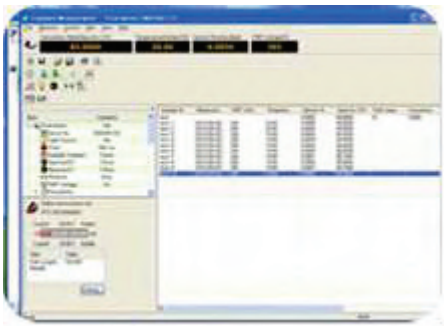




This spectrophotometer enables continuous measurements between ultraviolet and near infrared regions. The spectrophotometer has automatically switchable detectors by measurement wavelengths: a photomultiplier tube for the ultraviolet and visible regions, and a PbS detector for the near infrared region. Using an integrating sphere enables diffuse reflection measurement of solid surfaces and diffuse transmission measurement of suspension. Most of incident light to the sample, reflected and/or transmitted in all directions, is acquired by the integrating sphere, which enables accurate measurement.

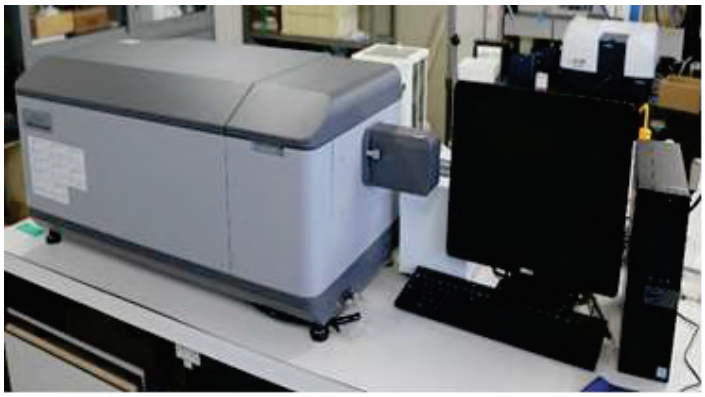
Polarimeter P-2300

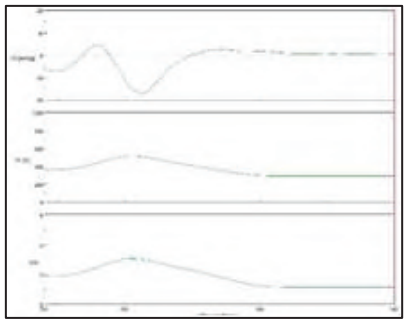




This polarimeter has both sodium and mercury lamps and a Glan-Taylor prism as a polarizer. The measurement wavelength is selectable from 589, 578, 546, 436 and 365 nm. The polarimeter has various types of cells, which enables to measure samples of at least 100 µl. Highly accurate measurement under temperature control by using an air-cooling Peltier cell is also performable.

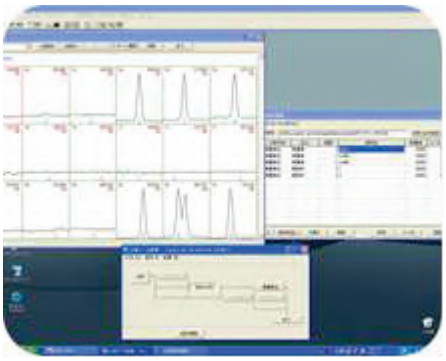
Circular Dichroism spectrometer J-1500 CD





CD (Circular Dichroism) spectrometer is suitable not only in the ultraviolet and visible regions, but also wide range of measurement wavelength from vacuum ultraviolet to near infrared (163~1600nm) which cover the chiral polymer, supramolecule, proteins and nucleic acids chemistry. Moreover, the CD measurement at the solid state is available with powder CD measurement unit.

Inductively Coupled Plasma Spectrometer ICP



This top-class ICP emission spectrometer has 2 sequential scanning spectrometers, which exhibits both high resolution and high speed. Plasma energy from the spectrometer excites component elements in samples. The spectrometer measures emission rays of the excited elements transiting to the lower energy levels. The spectrometer enables a wide range of highly accurate analyses including ppb-level analysis of trace elements in a solution and high concentration analysis such as composition analysis. Rapid simultaneous quantitative analysis of multiple elements is also performable.

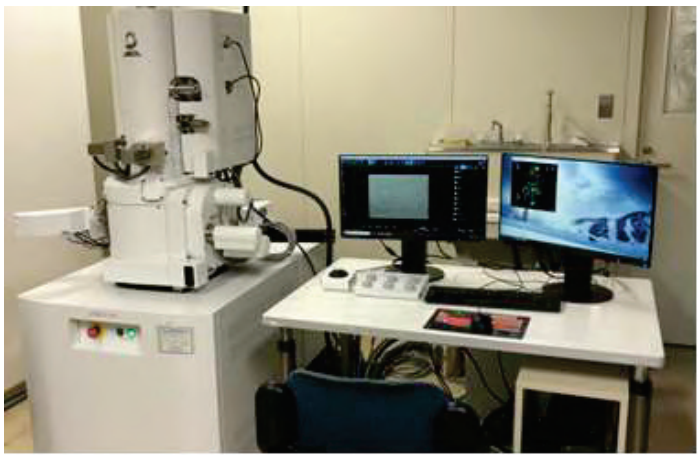
Element Analyzer EA

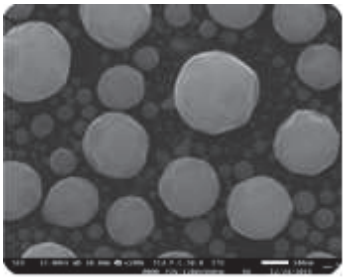
Elemental analysis is a classical and important quantitative analysis and purity test, which determines a weight percentage of elements composing pure samples including organic compounds by combustive and oxidative decomposing the pure samples. The analysis is mainly applied to confirmation of synthetic chemicals. Measurable elements are carbon, hydrogen and nitrogen. Ash content is also quantifiable.

Thermal Analyzer　TG-DTA・DSC

Thermal analysis comprises techniques for measuring a sample's physical and chemical properties as a function of temperature or time during heating or cooling. It is mainly used to assess reaction temperatures, enthalpies, and other thermal properties. The TG8120 integrates thermogravimetric (TG) and differential thermal analysis (DTA) with a horizontal balance, measuring both mass and thermal changes. The DSC8230 and DSC8270 are heat-flux differential scanning calorimeters (DSCs) that detect thermal energy variations. Their temperature ranges are: TG8120, room temperature to 1250℃; DSC8230, -125℃ to 450℃ (requiring liquid nitrogen for sub-ambient testing); and DSC8270, room temperature to 1500℃.

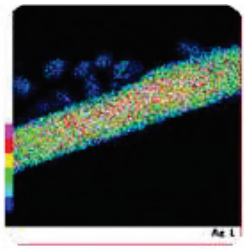
Scanning electron microscope FE-SEM





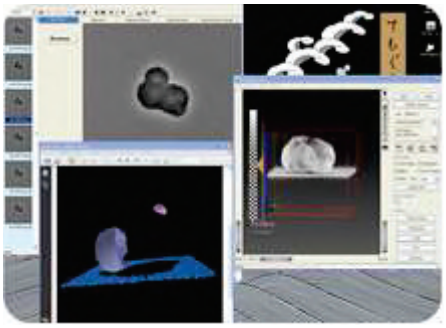
The scanning electron microscope (JSM-F100) can set the acceleration voltage of the electron beam from 10V to 30kV, and can handle samples that are vulnerable to heat damage and samples of insulation. It also has an option to observe at a lower vacuum than usual. In addition, the performance of elemental analysis using EDS has been greatly improved. Since this JSM-F100 can acquire data while switching between observation and analysis with a simple operation, it is possible to analyze the sample surface efficiently.

Transmission Electron Microscope FE-TEM



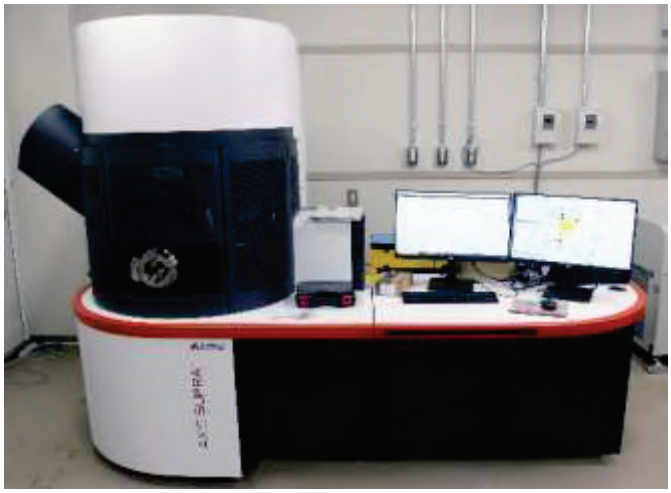
This microscope is a Schottky emission electron gun equipped with a ZrO/W emitter as a cathode, which has higher brightness and a smaller electron source than a thermionic electron gun and affords higher current stability and larger probe current than a normal field emission electron gun. Negative spherical aberration coefficients obtained by an attached spherical aberration corrector (Cs corrector) counteract positive spherical aberration coefficients obtained by a condenser lens having a symmetrical axis of a magnetic field, which enables to acquire smaller and higher intensity probes and to analyze elements with higher resolution. Detecting electrons transmitted through film samples acquires STEM images affording scattering/absorption, diffraction and phase contrasts.

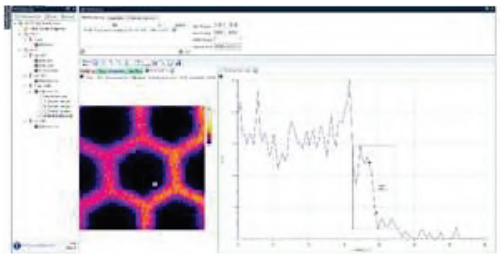
Transmission Electron Microscope 3 D-TEM



LaB_6 electron gun-equipped transmission electron microscope (200 kV) (JEM-2100) enables high resolution and high contrast observation, which is suitable for observation of biological samples. CCD camera enables to photography TEM images as digital data. High-tilt holder enables to set the tilt angle of samples to up to ±80°. TEM tomography system enables to automatically acquire continuously tilted images. 3D reconstruction of samples and visualization of 3D structures are performable by PC.

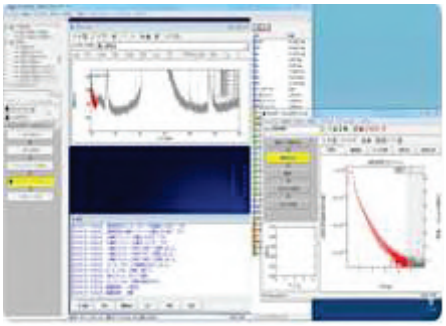
X-ray Photoelectron Spectroscopy XPS





The KRATOS ULTRA2 enables measurements with high energy resolution and is equipped with Al/Ag X-ray sources in addition to Mg/Al X-ray sources. The addition of Ag X-ray sources allows for the measurement of deeper regions that were difficult to measure with conventional equipment. Furthermore, electrons can be detected efficiently by utilizing magnetic lenses. This enables measurements at lower energies, which can reduce sample damage. In addition, imaging functionality and Ar cluster etching have been newly added. Ar cluster etching makes it possible to etch organic materials without damaging their structure. With this update, measurements of not only inorganic materials but also organic materials have been enhanced.

X-ray Diffractometer XRD

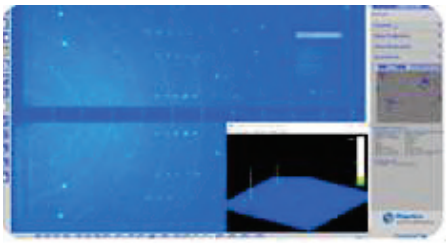


This multipurpose diffractometer measures scattered and diffracted X-rays generated from solid samples by irradiating strong X-rays (45kV, 200mA, Cu), which exhibits remarkable effect on film samples. The diffractometer is applicable to in-plane, film thickness, orientation, particle and void size distribution, and rocking curve measurements. Following guidance function allows users including beginners to easily obtain data. Choosing an incident X-ray source from Ge double crystals or Ge quadruple crystals enables high resolution measurement. The diffractometer has a scintillation detector, a one-dimensional detector enabling fast measurement within several minutes, and ICDD.

Fluorescent X-ray Diffractometer　XRF

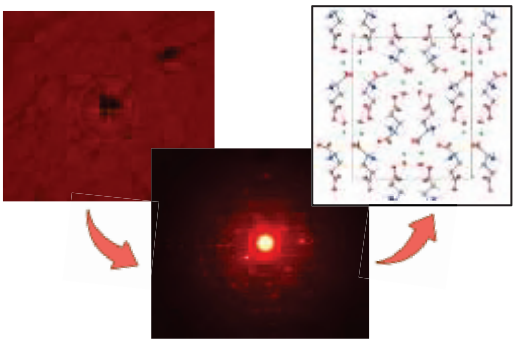
A vacuum tube (Rh) of 4kW used as an X-ray source in the XRF diffracts fluorescent X-rays generated from samples with 6 analyzing crystals (LiF, PET, Ge, RX-25, RX-75 and TAP). Two detectors (scintillation counter and gas flow proportional counter) in the WDX enable highly sensitive qualitative and quantitative analyses of various elements (from B to U). The XRF corresponds to powder, bulk and liquid samples. Continuous measurement (turret-type measurement) enables simultaneous measurement of up to 12 samples. The XRF has SQX program performing semi-quantification by FP method without standard samples through qualitative analysis results, and EZ scanning mode to perform SQX analysis.

X-ray Diffractometer for Single Crystals SC-XRD



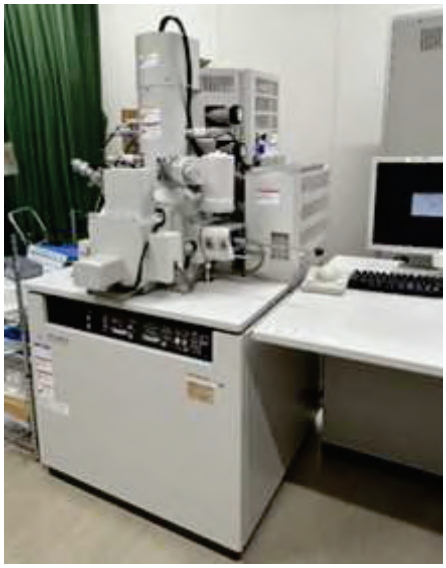
This single crystal X-ray structure analyzer is equipped with a rotating anti-cathode type high-intensity X-ray source and a 1-photon detection type hybrid pixel detector. The X-ray source can be selected from two sources, Mo and Cu. The detector with zero noise and a wide dynamic range can detect weak and strong reflections at the same time with a high S/N, and also enables high-speed shutterless measurement. Not only for metal complexes and low molecular weight compounds, but also for protein crystals are applicable.

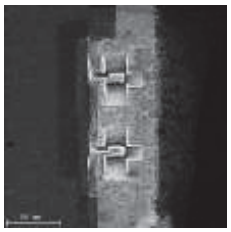
Fully Integrated Electron Diffractometer ~XtaLAB Synergy-ED~



Synergy-ED is a device for microcrystal electron diffraction (MicroED). Electrons interact more strongly with matter than X-rays, allowing MicroED to analyze submicron-sized crystals, which are difficult to analyze by single-crystal X-ray crystallography. In Synergy-ED measurements, microcrystals are mounted on an electron microscopy grid and irradiated with electrons under vacuum to obtain diffraction images. Measurements are possible at both room temperature and cryogenic temperature. The diffraction images are processed by a program built into the control software, and the intensity data is output in HKLF format. Software for X-ray crystallography such as Olex2 and SHELX is available for structure determination and refinement.

Focused Ion Beam (FIB) with Micro-Sampling System





This system uses a gallium (Ga) ion beam with an acceleration voltage range of 10kV to 40 kV to irradiate the sample and perform precise processing of specific areas. It is equipped with an observation function that utilizes secondary electrons emitted by ion beam irradiation, allowing real-time monitoring of the sample's surface shape while processing. Additionally, the system features a tungsten (W) thin film application function and a low acceleration voltage mode, minimizing damage to the sample during processing. This enables the system to be applied to a wide range of materials and structures, including semiconductor devices, for sectioning and creating submicron-level microstructures. Furthermore, the system is equipped with a micro-sampling system, allowing the entire process from small area sample pickup to thin section preparation to be performed consistently, making it possible to create high-precision ultrathin samples for transmission electron microscopy (TEM).

5． Subscription Journals

CAC subscribes to the following journals. Data collections are also available. If you want to read them, please feel free to ask CAC staffs

■Journals

1）Bunseki Kagaku　　１９５２～

2）Bunseki　　１９７５～

3）Advances in X-ray Chemical Analysis Japan　　１９７４～２０１６

■Videos for learning analysis [物質の科学・有機構造解析（Material Science and Organic Structural Analysis), The Open University of Japan]

■CAC Pamphlet, CAC Users' Guide

6. CAC Usage Rules

Please utilize the all instruments in CAC by following CAC usage rules.

- Opening Hours: 8:30 ~ 18:00 (except Saturdays, Sundays and national holidays)
- Utilization of CAC: Procedures under “CAC Web System” is required (p.23).
  (Access to "CAC Web System" in a webpage of CAC.)
- Overtime Utilization: SANKEN card is required for utilization of CAC after 18:00 on weekdays, and all days on Saturdays, Sundays and national holidays (p.22).
- No street shoes allowed (the entire building): Use dedicated slippers in footwear boxes in the entrance.
- No smoking: The entire building
- Reprinting: Published articles describing research results have to contain acknowledgements and the reprinted articles have to be submitted to CAC. →The articles are exhibited at the entrance of CAC.
  (e.g.) We thank the members of the Comprehensive Analysis Center, SANKEN, Osaka University, for spectral measurements, X-ray diffraction data, and microanalyses.

7. Overtime Utilization

SANKEN card is required to utilize CAC during 18:00 to 8:30 on weekdays, and all days on Saturdays, Sundays and national holidays.

1. SANKEN-issued SANKEN card (Figure 1) is required to enter and exit CAC and laboratories during overtime utilization. Be sure to have the SANKEN card.
2. Unlock/lock a door by holding the card over an electronic lock controller (Figure 2).
3. The electronic lock controller is contactless, which enables to use the SANKEN card even left in a wallet etc.
4. An electronic lock of a laboratory is automatically locked after entering the laboratory. When leaving the laboratory, unlock the electronic lock from the inside of the laboratory.
5. Left an opened door over 30 seconds sounds an alarm. The alarm is stopped and the door is locked when the closed door is confirmed.
6. All electronic locks are unlocked when unexpected power failure happens.
7. In emergency, uncover an emergency cover for the electronic lock of the inside of the entrance or open an emergency exit in every floor to exit.

Figure 1

Figure 2

8. CAC Web System

All instruments are required to access to "CAC Web System". Access to the system from the dedicated PC near an instrument or a PC set in each laboratory. The procedure is as follows;

1. Click "CAC Web System" in a webpage (top page) of CAC. Choose the desired instrument shown in a screen (Figure 3).
2. Find your favorite instrument (Figure 4). The usage status is described in gray letters under the device name. Unavailable operation is described using gray out. (Available now = available, Busy = used, Request Only = request analysis only, Maintenance = under maintenance)

U	for starting or stopping the instruments
W	for waiting after finishing the measurements by others
RS	for reserving your favorite time
RQ	for ordering the measurement by technical staff

3. Enter Email address and Password to login (Figure 5). (Click "Create an account" if you use the system for the first time).
4. Choose your request from Use, Wait, Reserve or Request.
5. When finishing the input to the system, click Logout in the left side of the screen.
   Note: The system is automatically disconnected by left no operation of the system over 30 minutes. Re-login to re-access to the system.

Figure 3

Figure 4

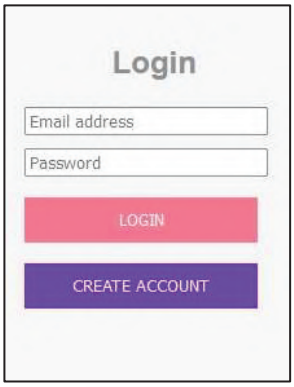


Figure 5

9. Reservation Procedures

①Self Measurement

1. After the login, click “U” button of the desired instrument (P.23, Figure 4, 5).
2. Choose the utilization time. Click "Start" button when starting measurement (Figure 6).
3. Click "Stop" button when you finish the measurement (Figure 7) Fund Code is used for choosing the payment source for the measurements. Please confirm the code number to your supervisor. In the following screen input the measurement information and comment if need (Figures 8, 9).

※If next user is waiting, please contact the next user by telephone.

Figure 6

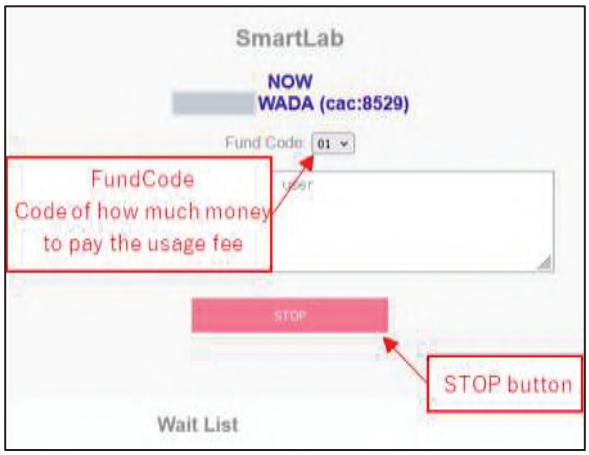


Figure 7

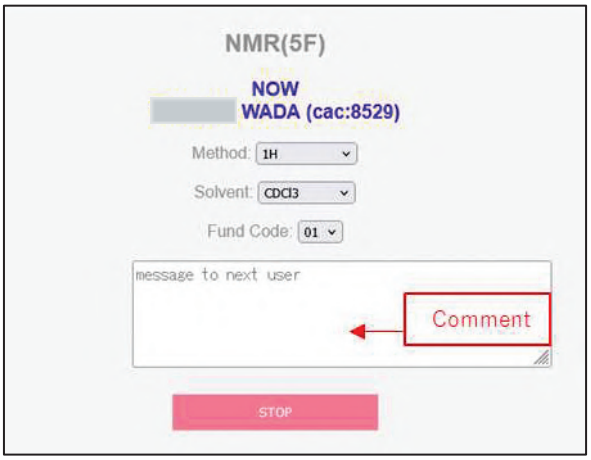


Figure 8

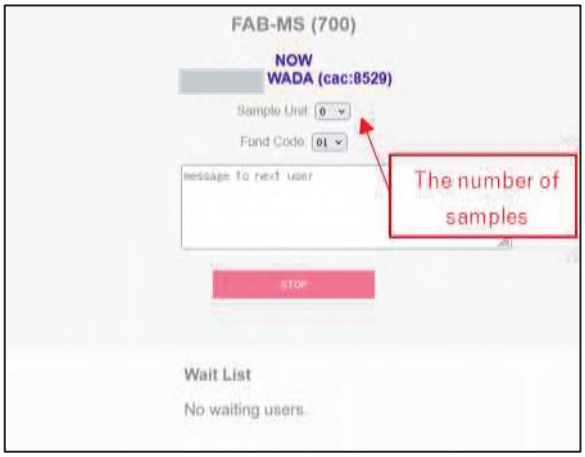


Figure 9

If the instrument is in use

Click "W" button. After choosing a utilization time and again Click "Waiting" button (Figure 10).

※Don't forget press the "start" button when you start measurement.

Figure 10

If you perform measurement on a specific date and time or long-time measurement at night

Click "RS" button. After choosing a utilization time and again click "RESERVE" button (Figure 11).

※Performing "RESERVE" is available for a reservation after 3 hours or later from the present time.※Perform "Waiting" for a reservation within 3 hours from the present time.

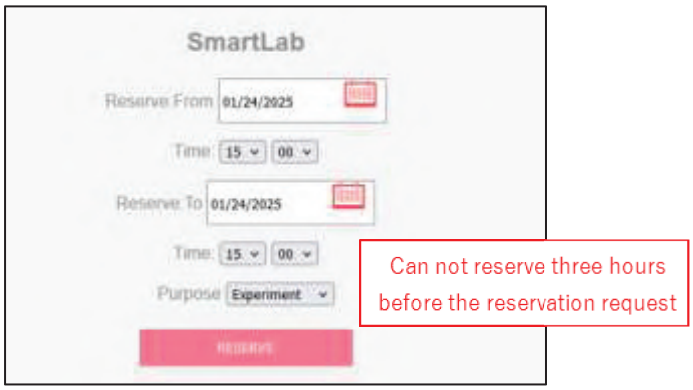


Figure 11

※Notes on the reserve button and wait button

When the time comes for you to use the system, click the "U" button to start the system, and then click the "U" button again to stop the system when the time is up. If you want to cancel your reservation, click on the "Reserve" button, and the "Cancel" button will appear in the field where you made your reservation. If you leave the reservation without canceling it, you will be charged. If you have made a reservation using the "Wait" button and have become the NextUser, please click the "U" button within 5 minutes to start. If you do not start within 5 minutes, your reservation will be voided and the next person will become the NextUser.

②Request Measurement

Request measurement is available for special measurement methods and nuclides and/or users with no utilization experience.

1) After the login, click "RQ" of Request of the device used.(P.23, Figure 4, 5).
2) Enter information about a sample and click ”Request” (Figure 12).
3) A record with the information about the sample is created (Figure 13). Print out and submit the 1 record with a sample to a staff of the measurement.

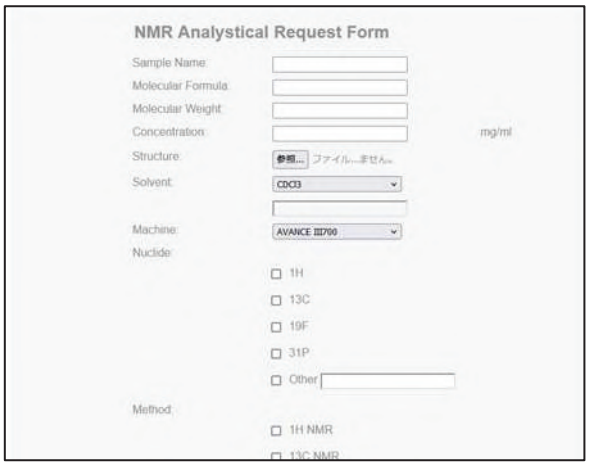


Figure 12

NMR request

MS request

Elemental Anal request

Figure 13

③Other request Measurement

Utilization of the JEM-ARM200F Transmission Electron Microscope, please contact the person in charge, Murakami, directly.

*Utilizing JEM-ARM200F is not reservable by accessing to CAC Web System.

(a) Request Measurement

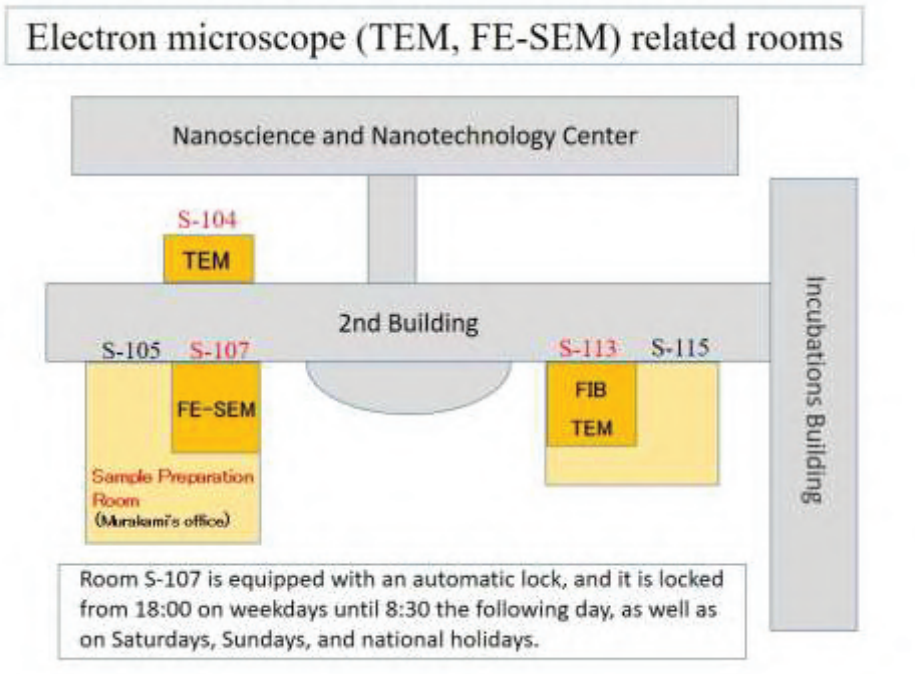
・Please feel free to discuss measurement and preparation method for samples. Please come in Room 105 (Sample Preparation Room) in the 2nd Building.

(b) Self Measurement

・Fulfill the both following requirements; utilization experience of any electron microscopes and permission by a CAC staff .

(c) Sample preparation

・A lecture on the sample preparation is held if needed.



10. Intramural and Extramural Cooperation

Collaborative Research Facility Network, former Effective Utilization Network for Chemistry Research Facility, centering on Institute for Molecular Science, National Institutes of Natural Sciences in 2007, promotes extramural cooperation. The network in the western Kinki region is positioned in Osaka University.

Assoc. Prof. Suzuki of CAC became the chairperson of the network of the western Kinki region since 2021. See the following webpage for details.

Center for Scientific Instrument Renovation http://chem-eqnet.ims.ac.jp/

A part of instruments in CAC is served for intramural and extramural cooperation by cooperating with Core Facility Center. Core Facility Center,with the developmental reorganization of Manufacturing Center, was established in the 1st of April, 2007. Fundamental instruments for research and education, with conventional supports of "manufacturing", research and education by Manufacturing Center, are repaired, restored and reborn to promote "reuse promotion" with intramural cooperation between staffs and students.

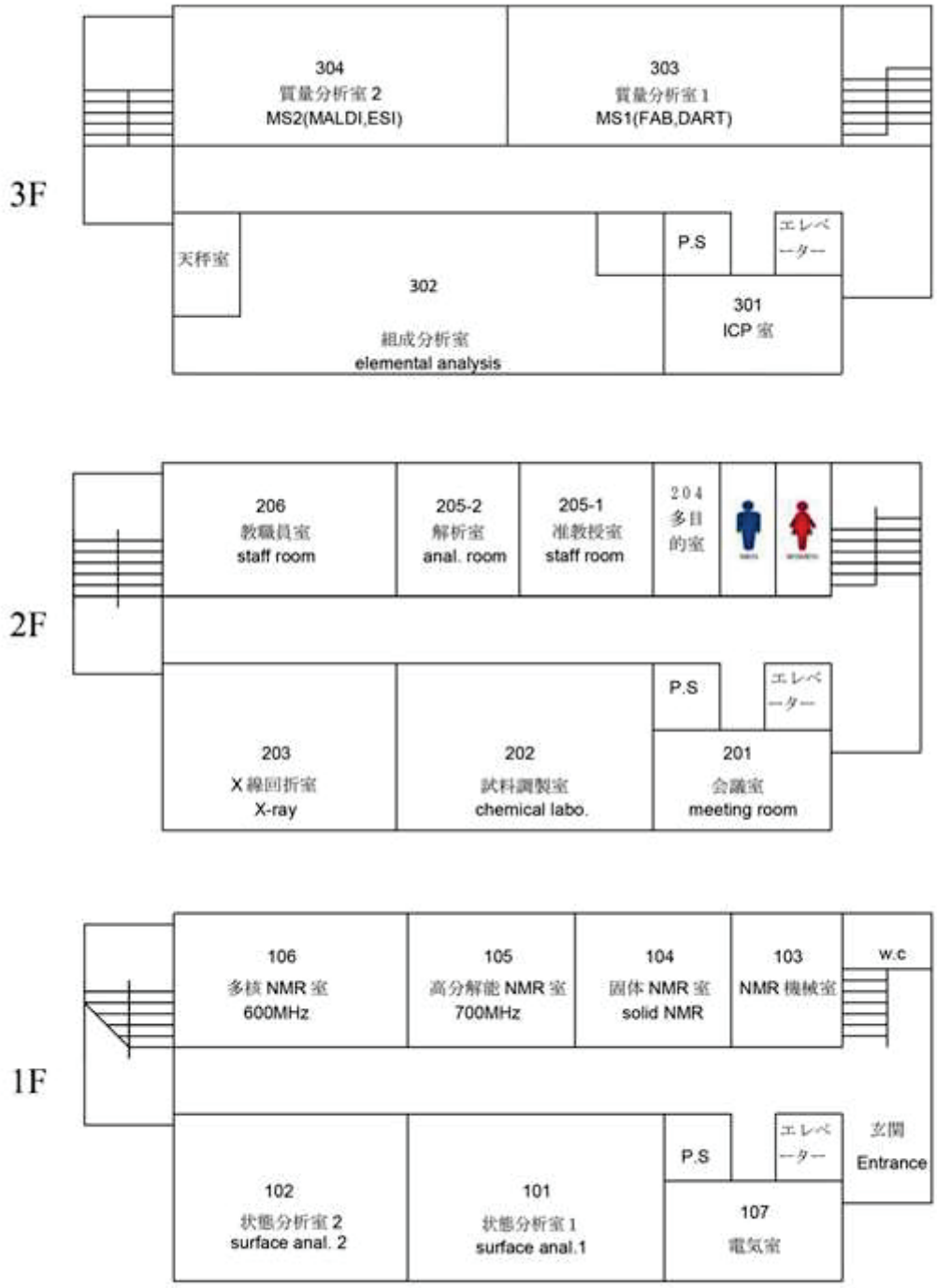
Collaborative Research Facility Network https://www.opf.osaka-u.ac.jp/

11. Pleas from CAC

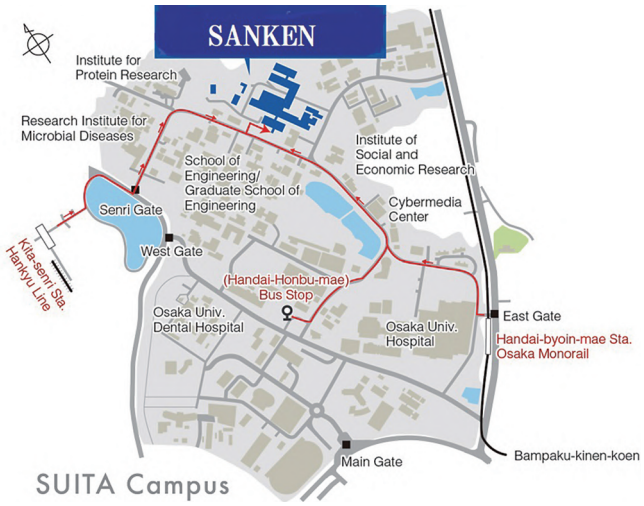
Contributions to research in CAC have to be persuasively exhibited due to transforming Osaka University into a national university corporation.
When articles describing research results acquired by using instruments in CAC are submitted, the articles have to contain acknowledgements (See p.21 of CAC Users' Guide). Additionally, when the articles are printed and published, submit one reprint of each of the articles to CAC.
CAC annually publishes CAC Information with research results acquired by using the instruments in CAC. The reprinted articles are exhibited at the entrance of the 1st floor of CAC. The articles have been favorably received by not only CAC users but also CAC visitors including high school students.

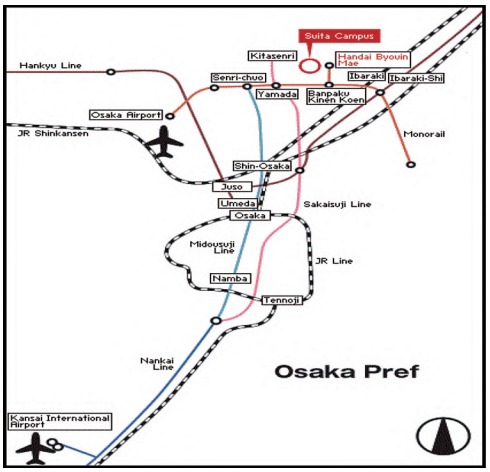
CAC staffs wish furthermore developments of research of all users' by using the instruments in CAC.

12. 館内地図


3F
304
質量分析室 2
MS2(MALDI,ESI)
303
質量分析室 1
MS1(FAB,DART)
天秤室
302
組成分析室
elemental analysis
P.S
エレベーター
301
ICP 室
2F
206
教職員室
staff room
205-2
解析室
anal. room
205-1
准教授室
staff room
204
多目的室
P.S
エレベーター
203
X 線回折室
X-ray
202
試料調製室
chemical labo.
201
会議室
meeting room
1F
106
多核 NMR 室
600MHz
105
高分解能 NMR 室
700MHz
104
固体 NMR 室
solid NMR
103
NMR 機械室
w.c
102
状態分析室 2
surface anal. 2
101
状態分析室 1
surface anal.1
P.S
エレベーター
107
電気室
玄関
Entrance

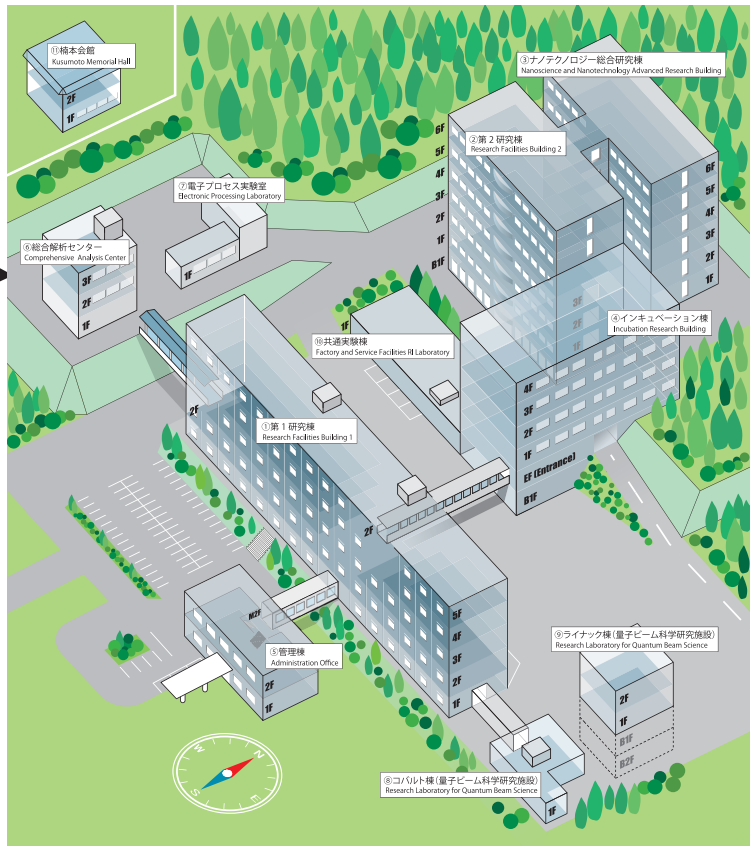
■ Map & Access





[Train] 20 minute-walk toward east from Kita Senri Station on Hankyu Senri Line.
[Bus] 10 minute-walk from Handai Honbu Mae by either of the following buses;
Hankyu Bus: Bound for Handai Honbu Mae from Senri-Chuo Station
Kintetsu Bus: Bound for Handai Honbu Mae from Ibaraki-shi Station
(via JR Ibaraki Station)
[Monorail] 15 minute-walk from Handai Byoin Mae Station on Osaka Monorail
(via Banpaku Kinen Koen Station)

Comprehensive Analysis Center →



Comprehensive Analysis Center
SANKEN, Osaka University, Mihogaoka 8-1, Ibaraki, Osaka, 567-0047, JAPAN
TEL:06－6879－8525　FAX：06－6879－8519
https://www.sanken.osaka-u.ac.jp/labs/cac/