リユース設備・機器 学内利用案内

Guide to Joint Use of Reuse Instruments at Osaka University

Find Solutions to meet your needs

ともに「使う」

科学機器リノベーション・工作支援センターでは、
本学所有の設備・機器の修理・バージョンアップを行い、
学内での共同利用を推進しています。
大阪大学の学生・教職員の方に利用いただける
分析機器・工作機器等についてご案内します。

大阪大学　科学機器リノベーション・工作支援センター

Center for Scientific Instrument Renovation and Manufacturing Support, Osaka University

■ Guide to Joint Use of Reuse Instruments at Osaka University

Based on the Master Plan for Instrument Maintenance at Osaka University, the Center for Scientific Instrument Renovation and Manufacturing Support carries out repairs and version upgrades on university research and education instruments with high general-applicability and utility. The repaired and upgraded instruments (reuse instruments) are operated as jointly used instruments by students and academic staff at Osaka University, and the center acts as a liaison handling applications for use.

■ Procedure for Joint Use of a Reuse Instrument

❶ Application for use

Please apply from the "Reuse Instrument List/Reservations" page on the center's website:
https://www.reno.osaka-u.ac.jp/reuse-cam

Please apply for use by 15:00 on the working day prior to the desired day of use (Friday if the desired day is Monday). (There are instrument types for which applications must be made further in advance, so please provide some leeway ahead of time.)
There are limitations on the use period depending on the funding source for payment.

Management expenses grants, scholarship donations:
Can be used throughout the year
Grants-in-Aid for Scientific Research (KAKENHI):
Up to December of each fiscal year
Commissioned research or joint research funding, etc.:
Up to February of each fiscal year

❷ Application approval, finalization of reservation

If there are no problems with the application content (use schedule, request for analysis, etc.), the applicant will be notified with an e-mail indicating that the reservation has been accepted.
Please understand that applicants may be asked to adjust their use schedule at the discretion of the person in charge of instrument management.

If you will be using an instrument for the first time, or need technical guidance, we will inquire about the experiment content and other information, and coordinate with the center regarding the schedule, etc.

❸ Instrument use, determination of fee

Please use the instrument according to the finalized schedule. To cancel or change reservations, please contact us using the details indicated below.

On the day following instrument use, we will send confirmation of the use time via e-mail.

❹ Payment of usage fee

In accordance with the finalized use time and fees, we will send a "Reuse Instrument Use Report" to the user and respective party responsible for paying usage fees; please confirm this on receipt.

Payment deadlines and other information on usage fees are as follows:

■ Management expenses grants
The department in charge of payment will be notified of the payment transfer procedure in October for use in January through September, and in February of the following year for use in October through December.

■ Expenses other than management expenses grants:
The center will send a bill to the department in charge of payment.
(Fees will be aggregated for each quarter, and a bill sent in the following month.)

For details, please see the website:
https://www.reno.osaka-u.ac.jp/gakunai/gaibu_shiharai.pdf

For inquiries regarding applications for use, fee payment, instruments for use, or analysis by staff, please contact the center as below.

Center for Scientific Instrument Renovation and Manufacturing Support (Suita District)
Tel.: 06-6879-4781 (Ext.: Suita 4781) E-mail: info@reno.osaka-u.ac.jp

■ List of Reuse Instruments by Instrument

Elemental Analysis

ICP (Inductively Coupled Plasma) Emission Spectrometer	Shimadzu ICPS-8100	ISIR・No.22	1
Inductively Coupled Plasma-Optical Emission Spectrometer	Agilent Technologies Agilent 720 ICP	Pharm・No.114	2
Electron Probe Microanalyzer (EPMA)	JEOL JXA-8800R	ISIR・No.6	3
Wavelength Dispersive X-ray Fluorescence (WDXRF) Spectrometer	Rigaku Supermini	OUIC・No.93	3
Organic Trace Element Analyzer (CHN Analyzer)	Yanaco CHN Corder MT-5	Sci・No.102	4

Mass Spectrometry

MALDI-TOF/TOF Mass Spectrometer (Bruker Ultraflex TOF/TOF)	Bruker Ultraflex TOF/TOF	Sci・No.3	5
MALDI-TOF Mass Spectrometer (Applied Biosystems Voyagr DERP)	Applied Biosystems Voyagr DERP	Sci・No.46	5
MALDI-TOF Mass Spectrometer	Shimadzu KRATOS AXIMA-CFR	Sci・No.101	6
ESI-Q-TOF Mass Spectrometer (Waters Q-TofUltimaAPI)	Waters Q-TofUltimaAPI	Pharm・No.49	6
ESI-Q-TOF Mass Spectrometer (Waters Q-Tof UltimaAPI)	Waters Q-Tof Ultima API	Eng・No.68	7
ESI-Qq-TOF Mass Spectrometer (Bruker micrO-TOFQ II)	Bruker micrO-TOFQ II	Sci・No.35	7
ESI-IT Mass Spectrometer	Bruker Esquire3000plus	Pharm・No.121	8
ESI-FT-ICR Mass Spectrometer (Bruker micrO-TOFQⅡ)	Bruker Daltonics APEX IV-hR	Sci・No.36	8
ESI (or DART)-LIT-Orbitrap Mass Spectrometer	Thermo Fisher Scientific LTQ-Orbitrap XL	Sci・No.118	9
High Resolution Double Focusing Magnetic Sector Mass Spectrometer with Fast Atom Bombardment (FAB) Ion Source (Low-MS)	JEOL JMS-700	Pharm・No.15	9
Direct Analysis in Real Time (DART) Mass Spectrometer	JEOL Accu TOF-DART	ISIR・No.53	10

NMR

400 MHz Liquid-state NMR Spectrometer(JEOL ECS-400)	JEOL ECS-400	Eng・No.30	11
400 MHz Liquid-state NMR Spectrometer(JEOL ECS-400)	JEOL ECS-400	Eng・No.70	12
400 MHz NMR-Liquid(Bruker Biospin AV-400M)	Bruker Biospin AV-400M	IPR・No.77	13
400 MHz Solid-state NMR Spectrometer(JEOL RESONANCE ECS400)	JEOL RESONANCE ECS400	Sci・No.120	13
400 MHz Liquid-state and Solid-state NMR Spectrometer(JEOL Resonance ECA400WB)	JEOL RESONANCE ECA400WB	Sci・No.90	14
500 MHz Liquid-state NMR Spectrometer(JEOL ECA-500)	JEOL ECA-500	Sci・No.67	15
500 MHz NMR-Liquid(Agilent Technologies Unity-Inova 500)	Agilent Technologies Unity-Inova 500	Eng. Sci.・No.84	15
600 MHz Liquid-state NMR Spectrometer(JEOL ECA-600)	JEOL ECA-600	ISIR・No.97	16
600 MHz Liquid-state NMR Spectrometer	Bruker BioSpin AVANCE III 600	Eng・No.106	16
600 MHz Liquid-state and Solid-state NMR Spectrometer(Agilent Technologies VNS600)	Agilent Technologies VNS600	Sci・No.75	17
700 MHz Liquid-state NMR Spectrometer(Bruker Biospin AVANCE 700)	Bruker Biospin AVANCE 700	Sci・No.76	18
200-MHz Solid-state NMR Spectrometer(Bruker BioSpin DSX-200)	Bruker BioSpin DSX-200	Museum・No.13	18
300 MHz Solid-state NMR Spectrometer (Chemagnetics Infinity 300)	JEOL CMX-300 (Chemagnetics Infinity 300)	Sci・No.4	19
400 MHz Solid-state NMR Spectrometer(Bruker Biospin AVANCE400WB)	Bruker Biospin AVANCE400WB	Sci・No.119	20
600 MHz Solid-state NMR Spectrometer(Bruker BioSpin AVANCE III 600WB)	Bruker BioSpin AVANCE III 600WB	ISIR・No.20	21

Electron Spin Resonance

Electron Spin Resonance (ESR) Spectrometer(JEOL JES-FA200)	JEOL RESONANCE JES-FA200	Sci・No.89	22
Electron Spin Resonance (ESR) Spectrometer(JEOL Resonance JES-TE200)	JEOL RESONANCE JES-TE200	Pharm・No.79	22
X-band Electron Spin Resonance Spectrometer	JEOL RESONANCE JES X320	Sci・No.123	23
Electron Spin Resonance (ESR) Spectrometer(Bruker Biospin ELEXSYS E500)	Bruker Biospin ELEXSYS E500	IPR・No.63	23

Magnetic Resoanace Imaging Apparatus

Magnetic Resonance Imaging (MRI) System for Small Animals	Bruker Biospin Avance II 500WB	・No.85	24

X-ray Diffraction

X-ray Diffractometer for Structural Analysis of Ultramicrocrystals	Rigaku RAPID 191R/FR-E	Sci・No.8	24
Single-crystal X-ray Diffractometer Equipped with Charge-Coupled-Device (CCD) Detector	Rigaku AFC7R & MERCURY 2	ISIR・No.21	25

■ List of Reuse Instruments by Instrument

X-ray Diffraction

High Intensity Single-crystal X-ray Diffractometer with Flat /Curve IP Detector	Rigaku FR-E & R-AXIS IV++	ISIR・No.74	25
Single-crystal X-ray Diffractometer	Rigaku VariMax RAPIDⅡ	Sci・No.107	26
Micro Area X-Ray Diffractometer	Rigaku RINT-RAPIDⅡ	Sci・No.124	26
Powder X-ray Diffractometer	Rigaku RINT2000	Dentistry・No.28	27
Multi-purpose X-ray Diffractometer(PANalytical X'pert PRO MPD)	PANalytical X'pert PRO MPD	Eng・No.44	27
Multi-purpose X-ray Diffractometer(Rigaku SmartLab)	Rigaku SMART LAB	ISIR・No.71	28
X-ray Diffractometer for Structural Analysis of Single Crystals under Low- Temperature and High-Pressure	Rigaku order-made system	Eng. Sci.・No.31	29

Electron Microscope

Scanning Electron Microscope (SEM)(JEOL JSM-5310LV)	JEOL JSM-5310LV	Eng. Sci.・No.51	29
Scanning Electron Microscope (SEM)(Hitachi High-Technologies S-2150)	Hitachi High-Technologies S-2150	ISIR・No.78	30
Field Emission Scanning Electron Microscope (FE-SEM)(Hitachi High-Technologies SU6600)	Hitachi High-Technologies Analytical Variable Pressure FE-SEM SU6600	Sci・No.58	30
Field Emission Scanning Electron Microscope (FESEM)(Hitachi High-Technologies S-4200)	Hitachi High-Technologies S-4200	Eng・No.43	31
Energy-dispersive X-ray Spectrometer	HORIBA EMXA-5770	Eng・No.42	31
Field Emission Scanning Electron Microscope (FESEM) with Energy-dispersive X-ray Spectrometer (EDS)(JEOL LSM-6335, JED-2300F)	JEOL JSM-6335, JED-2300F	ISIR・No.64	32
Field Emission Scanning Electron Microscope (FE-SEM) with Energy-dispersive X-ray Spectrometer (EDS)(JEOL JSM-7600F)	JEOL JSM-7600F	Sci・No.98	33
Transmission Electron Microscope (TEM)(Hitachi High-Tech. H-7650)	Hitachi High-Technologies H-7650	Sci・No.59	33
Transmission Electron Microscope (TEM)(JEOL JEM-2100)	JEOL JEM-2100	Sci・No.99	34

Electron microscopy sample preparation

wide diameter soft plasma etching device	Meiwa forsis co., LTD SEDE-P	Sci・No.98	34
Dual Beam Machining and Observation Apparatus	U.S.A.FEI XL830	Eng. Sci.・No.108	35
High Vacuum Coating System	Leica EM-MED 020	Sci・No.60	35
High Pressure Freezing System	Leica EM-HPM100	Sci・No.55	36
Freeze Substitution System	Leica EM-AFS2	Sci・No.54	36

Surface Analysis

X-ray Photoelectron Spectrometer (XPS)	Shimadzu KRATOS AXIS-165x	OUIC・No.94	37
Secondary Ion Mass Spectrometry (SIMS)	ATOMIKA SIMS410	ISIR・No.122	37

Morphological Observation

Atomic Force Microscope (AFM)	Keyence VN-8000, VN-8010	OUIC・No.96	38
	shimazu SPM-9500J3	Dentistry・No.125	38

Spectroscopic Analysis Apparatus

Micro-stopped-flow Fluorescence Spectrophotometer	Applied Photophysics SX17MV	Sci・No.33	39
Stopped-flow Rapid-scan Spectroscopy System	Unisoku RSP1000D	Eng・No.11	39
Circular Dichrometer(Jasco J-805)	Jasco J-805	Eng. Sci.・No.40	40
Circular Dichrometer(Jasco J-720W)	Jasco J-720W	Sci・No.32	40
Circular Dichrometer(Jasco/Oxford Instruments J-720W/MS4000)	Jasco/Oxford Instruments J-720W/MS4000	Sci・No.81	41
Laser Raman Spectrometer(Jasco NR-1800)	Jasco NR-1800	Pharm・No.72	42
Laser Raman Spectrometer Jasco(NR-1800)	Jasco NR-1800	Sci・No.82	42
Fourier Transform Infrared (FT-IR) Spectrometer(Jasco FT/IR-6100)	Jasco FT/IR-6100	Sci・No.83	43
FTIR Spectrometer Attached to IR Microscope	Thermo Fisher Scientific (former VG) Magna750, Nic-plan(INFRARED MICROSCOPE)	Eng・No.45	44
Absolute Photoluminescence Quantum Yield Spectrometer	Hamamatsu Photonics Quantaurus-QY(C11347-01)	OUIC・No.92	44
UV-Vis-NIR Spectrophotometer	HITACHI	Eng・No.116	45
Spectrofluorometer	HORIBA FluoroMax-4	Sci・No.117	46

Thermal Analyzers

High-sensitivity Isothermal Titration Microcalorimeter	MicroCal VP-iTC/1000	Sci・No.16	46
Ultrahigh-sensitivity Isothermal Titration Microcalorimeter	MicroCal iTC200	Sci・No.66	47

■ List of Reuse Instruments by Instrument

Thermal Analyzers

Nano-Differential Scanning Calorimeter (Nano-DSC)	CSC Nano-DSC	Sci・No.17	47
Thermal Analysis System (TG-DTA、DSC、TMA)	Rigaku Thermo Plus EVO Ⅱ	OUIC・No.95	48

Bio-related analytical instrument

Fluorescence Microscope	Zeiss Axio Observer, D1 equivalent	IFReC・No.80	49
Real-time Fluorescence Lifetime Imaging System	Hamamatsu Photonics Nikon Aqua Cosmos RATIO Basic System	Pharm・No.37	49
XL-I Analytical Ultracentrifuge	Beckman Coulter Optima XL-1	IPR・No.2	50
XL-A Analytical Ultracentrifuge	Beckman Coulter Optima XL-A	IPR・No.10	50
	BECKMAN COULTER Optima L-90K	Pharm・No.126	50
Fully Automated Nucleic Acid Extraction System	KURABO NA-1000	Pharm・No.47	51
Genetic Analyzer for DNA Sequencing and Fragment Analysis (LongCapillary_No.1)	Applied Biosystems ABI PRISM 310Genetic Analyzer	Med・No.1	51
Surface Plasmon Resonance(SPR)	GE Healthcare Biacore 3000	Sci・No.105	52
MicroArray Analysis Platform	Affymetrix	Sci・No.111	53
Flow Cytometer	BD FACS Calibur	Pharm・No.115	54

Liquid Chromatography

Fast Protein Liquid Chromatography (FPLC) System	GE Healthcare AKTA explorer 10Sfrac-950	Sci・No.34	54

Laser equipment

OPO Pulse Laser System	U.S.A. Continuum Powerlite9010 + Sunlite-EX + FX-1	Eng・No.109	55
High Power Glass Laser System	Continuum custom system	Eng・No.61	55
Laser Plasma EUV Light Source Apparatus	Coherent Custom Nd:YAG	ILE・No.25	56

Work Apparatus

High Resolution 3D Printer	Stratasys Objet Eden 260	Dentistry・No.88	56
3D Shaping Systems (3D Scanner/3D Printer)	Solutionix Stratasys Rexcan ⅢDimension BST 3D Printer/Catalyst Vere.4.2	Eng・No.65	57
NC Fine Machine	PMT Micro MC-3	OUIC・No.91	58

Computer

CLUSTER COMPUTER SYSTEM	DELL HPC-ProServer	IFReC・No.112	59

Other

Adiabatic Demagnetization Refrigerator System	Cambridge Magnetic Refrigeration MF-ADR50/3T	Eng. Sci.・No.27	60
Charged Particle Measuring Device	Sumitomo Heavy Industries	RCNP・No.24	60

1. Elemental Analysis ①

ICP (Inductively Coupled Plasma) Emission Spectrometer
Shimadzu ICPS-8100(No. 22)

■ **Specifications/Features**

The ICP-AES is a system enabling quantitative detection of elements contained in solution in extremely small amounts on the ppm order. It is used for composition analysis of single-crystal and thin-film samples, analysis of impurity elements in various types of samples, and detection of trace elements present in the environment.

This top-grade ICP emission spectrometer is equipped with two sequential spectrometers, and it simultaneously achieves both high resolution (0.0045 nm) and high-speed measurement.
Measurable elements: hydrogen, carbon, nitrogen, oxygen, halogens, and almost all elements except noble gases

■ **Fee**

Analysis by user	4,000 yen/hour
Analysis by staff	4,000 yen/hour + rate for operation 4,000 yen/hour Contact us about the fee for sample preparation. However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: 10,000 yen/hour

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 301

1. Elemental Analysis ②

Inductively Coupled Plasma-Optical Emission Spectrometer
Agilent Technologies Agilent 720 ICP(No. 114)

■ **Specifications/Features**

Attachement:

PC for data analysis, Autosampler, Ultrasonic nebulizer, hydride generator

echelle polychromator

Axially-viewed plasma

simulaneous measurement of full wavelength coverage by sealed CCD detector

Wavelength coverage : 167 - 785 nm

Wavelength resolution : < 0.007 nm (@200 nm)

RF frequency : 40 MHz

Maximum power : 2.0 kW ″

■ **Fee**

Analysis by user	4,000 yen/nour (Free of charge for users from Graduate school of Pharmaceutical Sciences)
Analysis by staff	None

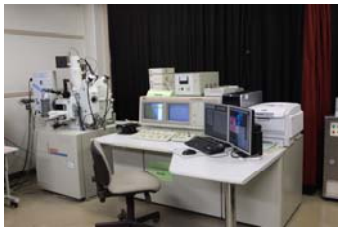
■ **Instrument location** Pharmaceutical Sciences, 2 Building, Room 102

4,000 yen/nour

(Free of charge for users from Graduate school of Pharmaceutical Sciences)

1. Elemental Analysis ③

Electron Probe Microanalyzer (EPMA)
JEOL JXA-8800R(No. 6)



■ **Specifications/Features**

4ch detector, 8 spectroscopic crystals (TAP, LIF, LIFH, PET, PETH, LDE1H, LDE2H, LDE1)

Measured elements: boron (atomic number 5) to uranium (atomic number 92)

Electron beam acceleration voltage (0.2-40 kV)

LaB6 electron gun, secondary beam image resolution 6 nm (can measure reflected electron beam image)

Cathode luminescence (300 nm-900 nm)

Analyzable area (80 mm × 80 mm)

Enables quantitative analysis of thin films

■ **Fee**

Analysis by user	1,000 yen/hour However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: Analysis by user: 2,500 yen/hour
Analysis by staff	3,000 yen/hour However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: Analysis by user: 7,500 yen/hour

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 102

Wavelength Dispersive X-ray Fluorescence (WDXRF) Spectrometer
Rigaku Supermini(No. 93)

■ **Specifications/Features**

This instrument is for wavelength dispersive X-ray fluorescence analysis.

This equipment uses a horizontal bottom surface irradiation system where the analysis surface of the sample is faced downward, and measurement is performed by irradiating with X-rays from beneath.

X-ray tube: Pd target, 200 W

Measurement atmosphere: Vacuum

Detected elements: F through U

■ **Fee**

Analysis by user	5,000 yen/hour
Analysis by staff	5,000 yen/hour (The fee is the basic rate. An extra fee will be charged depending on the analysis content and difficulty.)

■ **Instrument location** Office for University-Industry Collaboration, A Building, A-004

1. Elemental Analysis ④

Organic Trace Element Analyzer (CHN Analyzer)
Yanaco CHN Corder MT-5(No. 102)

■ **Specifications/Features**

- ·Measured elements: Hydrogen, carbon, nitrogen
- ·Measurement method:
  Differential thermal conductivity method, self-integration method
- ·Measurement precision: Absolute error, less than ±0.3%
- ·Minimum sample required: Organic material, approximately 2 mg
- ·Measurement range:
  Hydrogen 0.5-400 μg, carbon 3-2,600 μg, nitrogen 1-1,000 μg

■ **Fee**

Analysis by user	None
Analysis by staff	Measurement/analysis 1. C, H, O, N, S, Cl, Br, I: 3,000 yen/sample 2. Measurement/analysis containing elements other than above: 4,000 yen/sample *There will be an extra fee when ash is produced (1,000 yen/sample) **Cannot be used with samples containing elements such as Se, Ru, Re, Os, Hg, and samples with high hygroscopicity or volatility.

■ **Instrument location** Science, c Building,Room 230

2. Mass Spectrometry ①

MALDI-TOF/TOF Mass Spectrometer (Bruker Ultraflex TOF/TOF)
Bruker Ultraflex TOF/TOF(No. 3)

■ **Specifications/Features**

Enables MALDI-TOF/TOF mass spectrometry.
(See: http://www.bruker.co.jp/daltonics/product/ultraflex3.html)
The system is equipped with an automatic analysis robot ("twister"), and therefore can also analyze multiple samples.
(If there is a need for high-precision analysis to approximately 6 significant digits, it is recommended to use FT-ICR MS (No. 36) (consult with staff).)

■ **Fee**

Analysis by user	3,000 yen/hour (Contact us regarding the fee for analysis with an assistant.)
Analysis by staff	30,000 yen/sample

■ **Instrument location** Science,H Building,Room 307

MALDI-TOF Mass Spectrometer(Applied Biosystems Voyagr DERP)
Applied Biosystems Voyagr DERP(No. 46)

■ **Specifications/Features**

Enables measurement and identification of biomolecules, organic molecules and similar substances with a molecular weight of about 500 or more.

■ **Fee**

Analysis by user	500 yen/sample (same for users from the Graduate School of Science) Technical guidance fee: 1,000 yen/hour
Analysis by staff	None

■ **Instrument location** Science, B Building,Room 132, Joint Experiment Laboratory

2. Mass Spectrometry ②

MALDI-TOF Mass Spectrometer
Shimadzu KRATOS AXIMA-CFR(No. 101)

■ **Specifications/Features**

Measurable range of m/z: 10-300,000

Maximum resolution: 10,000 (in reflectron mode; about 3,000 in linear mode)

Operation is comparatively easy, and the system is useful for analyzing a wide-range of compounds. The unit is also equipped with an automatic analysis system enabling automatic analysis of a maximum of 384 samples.

■ **Fee**

Analysis by user	Total: 1+2 1. Basic rate: 500 yen/sample 2. Hourly basic rate: 2,000 yen/hour
Analysis by staff	Total: 1+2 1. Basic rate: 2,000 yen/sample 2. Hourly basic rate: 2,000 yen/hourr For other supplies provided in the analysis laboratories, users should pay according to the amount used

■ **Instrument location** Science, Interdisciplinary Research Building 3F, Room NMR/MS

ESI-Q-TOF Mass Spectrometer(Waters Q-TofUltimaAPI)
Waters Q-TofUltimaAPI(No. 49)

■ **Specifications/Features**

This instrument enables the high-resolution mass spectrometry needed for structural analysis of organic compounds and biomolecules, all the way as far as ultra-minute amounts.

It can be used in linkage with an HPLC as an LC-MS, and also has an MS/MS function. Therefore it has general applicability in a wide range of fields including analysis of peptide structure.

■ **Fee**

Analysis by user	Consult with staff.
Analysis by staff	20,000 yen/sample

■ **Instrument location** Pharmaceutical Sciences, 307

2. Mass Spectrometry ③

ESI-Q-TOF Mass Spectrometer (Waters Q-Tof UltimaAPI)
Waters Q-Tof Ultima API(No. 68)

■ **Specifications/Features**

This instrument enables the high-resolution mass spectrometry needed for structural analysis of organic compounds and biomolecules, all the way as far as ultra-minute amounts.

It can be used in linkage with an HPLC as an LC-MS, and also has an MS/MS function. Therefore it has general applicability in a wide range of fields including analysis of peptide structure.

■ **Fee**

Analysis by user	None
Analysis by staff	20,000 yen/sample

■ **Instrument location** Engineering, A14-116

ESI-Qq-TOF Mass Spectrometer(Bruker micrO-TOFQ Ⅱ)
Bruker micrO-TOFQ Ⅱ(No. 35)

■ **Specifications/Features**

Enables measurement of mass from small molecules to macromolecules (e.g., proteins).

The unit is linked on-line with a nano LC, and the analysis section is the hybrid type which can handle both the quadrupole type and the time-of-flight type.

LC-MS/MS can be performed with high-precision and high-speed, and the instrument can be used for analyzing a variety of biomolecules, etc.

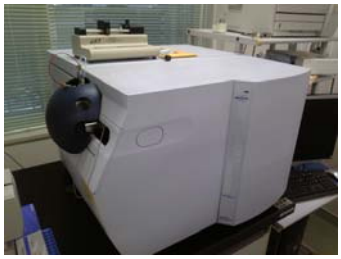
■ **Fee**

Analysis by user	None
Analysis by staff	30,000 yen/sample (Contact us about the fee for data analysis and data analysis by an assistant.)

■ **Instrument location** Science, D Building,Room 103

2. Mass Spectrometry ④

ESI-IT Mass Spectrometer
Bruker Esquire3000plus(No. 121)



■ **Specifications/Features**

This machine is equipped with electrospray ionization and ion trap analyzer, and is applicable to structural analysis of drugs and proteins.
This machine can produce fragment ions and MS/MS analysis is possible, and hence is competent to analyze drug metabolites.

■ **Fee**

Analysis by user	10,000 yen/hour
Analysis by staff	10,000 yen/hour
	Please contact us before use.

■ **Instrument location** Graduate School of Pharmaceutical Sciences, 1st Building, 5F, Room 505

ESI-FT-ICR Mass Spectrometer(Bruker micrO-TOFQⅡ)
Bruker Daltonics APEX IV-hR(No. 36)

■ **Specifications/Features**

This ESI-FT-ICR type mass spectrometer enables measurement of the molecular weights of biomolecules (proteins, sugars, DNA) at a precision of roughly 6 significant digits or more.
It is equipped with a superconducting magnet, and is capable of precise molecular weight analysis of entire molecules, proteome analysis, and measurement with mixtures of multiple molecules.

■ **Fee**

Analysis by user	None
Analysis by staff	Total: 1+2
	1. Basic rate: 2,000 yen/sample
	2. Hourly basic rate: 3,500 yen/hour
	option(LC) 1,000 yen/sample
	option(nanoLC) 3,000yen/sample
	oftion(ETD/ECD)1,000 yen/sample
	For other supplies provided in the analysis laboratories, users should pay according to the amount used
	(Contact us about the fee for data analysis and data analysis by an assistant.)

■ **Instrument location** Science, C Building,Room 103

2. Mass Spectrometry ⑤

ESI (or DART)-LIT-Orbitrap Mass Spectrometer
Thermo Fisher Scientific　LTQ-Orbitrap XL(No. 118)

■ **Specifications/Features**

Measurable m/z range: 10-4,000

Maximum resolution: 100,000 (@ m/z 400 using FT-MS mode)

Mass accuracy: ±0.0005 (@ m/z 400 using FT-MS mode)

Other attachments:

nano-UPLC

… We can obtaine MS and MS/MS simultanously.

DART ion source

… This attachment is suitable for through put analysis of lower molecular weight conpounds.

■ **Fee**

Analysis by user　Basic rate: 500 yen/sample + hourly-basic rate 3,500 yen/hour

Analysis by staff　Basic rate: 2,000 yen/sample + hourly-basic rate 3,500 yen/hour

For other supplies provided in the analysis laboratories, users should pay according to the amount used

■ **Instrument location**　Science, Interdisciplinary Research Building, 3F, Room:NMR/MS

High Resolution Double Focusing Magnetic Sector Mass Spectrometer with Fast Atom Bombardment (FAB) Ion Source (Low-MS)
JEOL JMS-700(No. 15)

■ **Specifications/Features**

Double focusing mass spectrometer

Ionization mode: FAB

Normal measurement (molecular weight: 200-2,000)

High-resolution measurement

■ **Fee**

Analysis by user　None

Analysis by staff　・Normal measurement (Low-MS): 5,000 yen/sample

・High-resolution measurement (High-MS): 10,000 yen/sample

■ **Instrument location**　Pharmaceutical Sciences, 143

2. Mass Spectrometry ⑥

Direct Analysis in Real Time (DART) Mass Spectrometer
JEOL Accu TOF-DART(No. 53)

■ **Specifications/Features**

This is a mass spectrometer equipped with a DART (Direct Analysis in Real Time) ion source, specially for high-resolution time-of-flight mass spectrometers, made by JEOL USA, Inc.

DART is a new ion source which enables speedy, non-contact analysis of a sample under atmospheric pressure and ground potential. By combining AccuTOF and DART, it is possible to accurately estimate elemental composition based on precise mass.

The system is applicable to gases, liquids and solids. It enables analysis without pretreatment (such as sampling or solvent extraction), particularly of chemical substances on the surface of matter. This is effective for screening and high-throughput analysis.

■ **Fee**

Analysis by user	600 yen/sample However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: 1,500 yen/sample
Analysis by staff	None

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 303

3. NMR ①

400 MHz Liquid-state NMR Spectrometer (JEOL ECS-400)
JEOL ECS-400 (No. 30)

■ **Specifications/Features**

This instrument is for non-destructive research in which radio waves of atomic nuclei placed in a magnetic field are used to measure what sort of environment the nuclei, which are the focus of study in the fields of organic and inorganic chemistry, are placed in. Diverse types of information can be obtained by irradiating using combinations of electromagnetic waves with various waveforms. Since the system uses Windows software, it operates quickly, and ease of operation is improved. This system is used for training in student experiments.

・1H resonance frequency: 400 MHz; 13C resonance frequency: 100 MHz (Magnetic field strength: 9.4 T)
・Delta Ver. 5.0.4.2 (Windows 7)
・Auto-tune 5 mm FG/TH tunable probe
・10 mm probe for low-frequency nuclei
・5 mm FG/TFH 3-nuclei probe for two-channel CFH measurement
・Heater for variable temperature measurement (10 L, 30 L)
・Unit for long-term low-temperature measurement (down to −50° C)
・Auto sample changer

■ **Fee**

Analysis by user	1,800 yen/hour (1,650 yen/hour for continuous use of over 8 hours per sample)
Analysis by staff	2,400 yen/hour (1,500 yen/hour for less than half an hour of use)

■ **Instrument location** Engineering, C7-113

3. NMR ②

400 MHz Liquid-state NMR Spectrometer (JEOL ECS-400)
JEOL ECS-400 (No. 70)

■ **Specifications/Features**

This instrument is for non-destructive research in which radio waves of atomic nuclei placed in a magnetic field are used to measure what sort of environment the nuclei, which are the focus of study in the fields of organic and inorganic chemistry, are placed in. Diverse types of information can be obtained by irradiating using combinations of electromagnetic waves with various waveforms. Since the system uses Windows software, it operates quickly, and ease of operation is improved. This system is used for training in student experiments.

・1H resonance frequency: 400 MHz; 13C resonance frequency: 100 MHz (Magnetic field strength: 9.4 T)

・Delta Ver. 5.0.4.2 (Windows 7)

・Auto-tune 5 mm FG/TH tunable probe

・10 mm auto-tune probe

・Heater for variable temperature measurement (10 L, 30 L)

・Unit for long-term low-temperature measurement (down to −35° C)

■ **Fee**

Analysis by user	1,800 yen/hour (1,650 yen/hour for continuous use of over 8 hours per sample)
Analysis by staff	2,400 yen/hour (1,500 yen/hour for less than half an hour of use)

■ **Instrument location** Engineering, C7-113

3. NMR ③

400 MHz NMR-Liquid(Bruker Biospin AV-400M)
Bruker Biospin AV-400M(No. 77)

■ **Specifications/Features**

400 MHz NMR for solutions (also equipped with BBFOplus probe for multi-nuclei observation).

Comprised of magnet and electromagnetic irradiation section with hydrogen nuclear magnetic frequency of 400 MHz.

The system also has an inclined magnetic field unit, and units for exciting and observing nuclei other than hydrogen (e.g., 15N, 13C, 19F, and 31P nuclei).

It is primarily used for determining the 3-dimensional structure of biomolecules such as proteins, and analyzing functional structure. The system enables direct as well as indirect measurement of multiple nuclides.

The system has an auto-tuning and matching function, and can easily be used by persons who are not NMR specialists.

■ **Fee**

Analysis by user	1,000 yen/day (Fee for technical guidance: 5,000 yen/day)
Analysis by staff	None

■ **Instrument location** Institute for Protein Research, NMR Building 1F

400 MHz Solid-state NMR Spectrometer(JEOL RESONANCE ECS400)
JEOL RESONANCE ECS400(No. 120)

■ **Specifications/Features**

・OS：Windows7 Software：Delt Ver.5.0.5

・Auto sample changer(24 peaces)

Probe

・5 mm JEOL TH5AT/FG probe

S/N比：1H ≧ 370:1 13C ≧ 270:1 15N ≧35:1 31P ≧ 130:1

Measurement temperature range：−100 °C to 150 °C

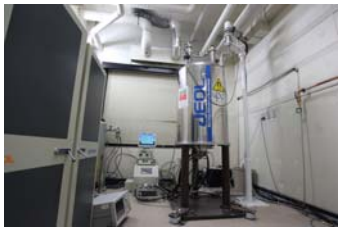
■ **Fee**

Analysis by user	None
Analysis by staff	Rates 1.Basic rate:2,000 yen/sample 2.Time-based rate: Less than 10 hours :200 yen/min. Over 10 hours :200 yen/hour 3.Temperature-based rate :1 degree up 1,000 yen 1 degree down 2, 000 yen Total fee: 1+2+3

■ **Instrument location** Science, D Building, Room 104

3. NMR ④

400 MHz Liquid-state and Solid-state NMR Spectrometer(JEOL Resonance ECA400WB)
JEOL RESONANCE ECA400WB(No. 90)



■ **Specifications/Features**

・Solid probe

4mm JEOL HXMAS Probe

Maximum rotation speed : 18kHz

Measurement temperature range : -100℃ to 150℃

5 mm Doty WL solid probe no spin

Measurement temperature range: -10° C to 150° C

7 mm Doty H/X CPMAS solid probe

Maximum rotation speed ≤ 7 kHz

Measurement temperature range: Room temperature to 150° C

・Probe for semisolid substances

4 mm H/X FGMAS probe

S/N ratio: 1H ≥ 90:1

Maximum rotation speed ≤ 9 kHz (Kel-F cap), ≤ 18 kHz (Vespel cap)

Measurement temperature range: Room temperature to 50° C

・Solution probe

5 mm JEOL 40TH5AT/FG2WB Probe

S/N ratio: 1H ≥ 220:1 13C ≥ 180:1

Measurement temperature range: Room temperature to 100° C

・Wide range temperature HXMAS /

VT probe could not measure until now Measurement of

low frequency nuclei of 15 N or less is possible Main observation nuclei:

14N・15N・25Mg・33S・35Cl・43Ca・47Ti・49Ti・97Mo

■ **Fee**

Analysis by user	None
Analysis by staff	Total: 1+2+3+4+5
	1. Basic rate: 2,000 yen/sample
	2. Time-based rate: 200 yen/30 min. for less than 10 hours
	200 yen/hour for over 10 hours
	3. Temperature-based rate: 1 degree up 1,000 yen
	1 degree down 2,000 yen
	4. Cell use charge:
	When using a solid cell, or semisolid cell: 10,000 yen/sample
	5. Sample preparation cost: When adjustment is required: 2,000 yen/sample

■ **Instrument location** Science, C Building, Room 112

3. NMR ⑤

500 MHz Liquid-state NMR Spectrometer(JEOL ECA-500)
JEOL ECA-500(No. 67)

■ **Specifications/Features**

1H resonance frequency: 500 MHz

・Delta Ver. 5.01 (Windows 7)

・Equipped with 5 mm TH5ATFG2 auto-tuning

・Measured temperature range: -20° C to 60° C (for measurement of trace amounts of natural materials)

・Instrument for measuring the solution NMR of protons and multiple nuclei

・Equipped with long-term VT (requires no liquid nitrogen up to -50° C)

・Measurable nuclides: 1H, 19F, 31P-109Ag

■ **Fee**

Analysis by user: Consult with staff.

Analysis by staff: Total: 1+2+3

1. Basic rate: 2,400 yen/sample
2. Time-based rate:Less than 10 hours: 240 yen/30 min
   Over 10 hours: 240 yen/hour
3. Temperature-based rate:1 degree up: 1,200 yen/degree
   1 degree down: 2,400 yen/degree

■ **Instrument location** Science, D Building, Room 104

500 MHz NMR-Liquid(Agilent Technologies Unity-Inova 500)
Agilent Technologies Unity-Inova 500(No. 84)

■ **Specifications/Features**

Variable temperature unit: -10 to 130° C

Probes: PEG probe (φ3 mm, φ5 mm)

Multi-nuclei probe

Probe for liquid chromatography NMR

■ **Fee**

Analysis by user: Total: 1+2+3

1. Basic rate: 300 yen/case
2. Time-based rate: Less than 10 hours: 600 yen/hour
   Over 10 hours: 300 yen/hour
3. Low-temperature measurement: 3,000 yen/case
   (Fees are half price for users from the Department of Materials Engineering Science, Graduate School of Engineering Science. However, there is assignment of coolant filling duty.)

Analysis by staff: None

■ **Instrument location** Engineering Science, Analysis Building

3. NMR ⑥

600 MHz Liquid-state NMR Spectrometer(JEOL ECA-600)
JEOL ECA-600(No. 97)

■ **Specifications/Features**

The JNM-ECA600 from JEOL is an FT-NMR system developed by exploiting state-of-the-art digital technology and high frequencies. The JNM-ECA600 MHz NMR incorporates auto-tuning and matching, and has gradient shimming. With this system, it is possible to easily obtain high-quality NMR spectra with good reproducibility. In addition, it is possible to conduct the optimization of presaturation for water suppression, and measurement of difference spectra, etc. Furthermore, the system has a CHF 3-channel probe, which is extremely convenient for measuring compounds containing 19F.

■ **Fee**

Analysis by user	600 yen/hour
Analysis by staff	1,200 yen/hour On-campus company-affiliated persons from facilities such as the Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building: Analysis by user: 1,500 yen/hour Analysis by staff: 3,000 yen/hour

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 106

600 MHz Liquid-state NMR Spectrometer
Bruker BioSpin AVANCE III 600(No. 106)

■ **Specifications/Features**

NMR spectrometer equipped with:Bruker Ultra-shield 14.1 T, 1H resonance frequency 600MHz, 13C resonance frequency 150MHz

NMR spectrometer equipped with a low temperature gas generator for overnight low temperature runs

The following probes are available for this technique.

Multinuclear Broadband Fluorine Observe BBFO-H&F

Inverse probe: 5 mm and 1.7 mm TXI

■ **Fee**

Analysis by user	Analysis by user: 1,800 yen/hour 1,650 yen/hour for continuous use over 8 hours per sample.
Analysis by staff	Analysis by staff: 3,000 yen/hour 2,100 yen/hour for less than half an hour of use.

■ **Instrument location** Engineering, Analysis Center C7-113

3. NMR ⑦

600 MHz Liquid-state and Solid-state NMR Spectrometer(Agilent Technologies VNS600)
Agilent Technologies VNS600(No. 75)

■ **Specifications/Features**

・OS: Red Hat, Software: VnmrJ Ver. 3.2C

・Long-term VT (enables measurement without liquid nitrogen down to -50° C) Probe

・5 mm Varian 1H-19F{13C/15N} PFG Triple Resonance Probe

S/N ratio: 1H ≥ 1,080:1, 19F ≥ 1,080:1

Measurement temperature range: -10°C to 80°C

・5 mm Varian 15N, 13C(1H-19F) PFG Triple Resonance Probe

S/N ratio: 1H ≥ 330:1, 13C ≥ 320:1, 15N ≥ 32:1, 19F ≥ 330:1

Measurement temperature range: -10°C to 130°C

・3.2 mm Varian 1H/31P-13C/13C-15N BioMAS Probe

Maximum rotation speed ≤ 25 kHz

Measurement temperature range: -80° C to 130° C

・1.2 mm Varian HXY UltraFastMAS Probe

Maximum rotation speed ≤ 60 kHz

Measurement temperature range: 0°C to 65°C

■ **Fee**

Analysis by user	None
Analysis by staff	Total: 1+2+3+4
	1. Basic rate: 3,000 yen/sample
	2. Time-based rate: Less than 10 hours: 300 yen/30 min.
	Over 10 hours: 300 yen/hour
	3. Temperature-based rate: 1 degree up: 1,500 yen
	1 degree down: 3,000 yen
	4. Measurement cell: 20,000 yen/sample (1.2mmφcell)
	10,000 yen/sample (other cell except 1.2mmφcell)

■ **Instrument location** Science, Interdisciplinary Research Building 3F, Room: NMR・MS

3. NMR ⑧

700 MHz Liquid-state NMR Spectrometer(Bruker Biospin AVANCE 700)
Bruker Biospin AVANCE 700(No. 76)

■ **Specifications/Features**

・OS: CentOS, Software: TopSpin Ver. 2.0.1

・Long-term VT (enables measurement without liquid nitrogen up to 0° C) Probe

・φ5 mm PH TXI 700S4 H-C/N-D Z-gradient

S/N ratio: 1H ≥ 1,300:1

Measurement temperature range: -40° C to 80° C

・φ5 mm CP TCI 700S4 H-C/N-D Z-gradient

S/N ratio: 1H ≥ 7,000:1, 13C ≥ 1,200:1

Measurement temperature range: -40° C to 80° C

■ **Fee**

Analysis by user	None
Analysis by staff	Total: 1+2+3 1. Basic rate: 4,000 yen/sample 2. Time-based rate: Less than 10 hours 1,400 yen/30min. Over 10 hours 1,400 yen/hour 3. Temperature-based rate: 1 degree up 1,000 yen 1 degree down 2,000 yen

■ **Instrument location** Science, D Building, Room 104

200-MHz Solid-state NMR Spectrometer(Bruker BioSpin DSX-200)
Bruker BioSpin DSX-200(No. 13)

■ **Specifications/Features**

H-1 resonance frequency: 200.13 MHz

C-13 resonance frequency: 50.3 MHz

Possible types of measurement:

● Multinuclear solid-state high-resolution NMR spectra measurement (room temperature)

Applicable nuclides (C-13, N-15, Si-29, P-31, Xe-129, etc.)

● H-1, H-2 wide-range NMR measurement (variable temperature: 150K to room temperature)

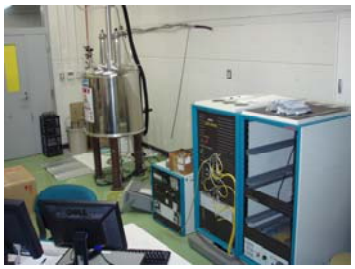
■ **Fee**

Analysis by user	None
Analysis by staff	1,000 yen/hour

■ **Instrument location** Center for Education in Liberal Arts and Sciences, Laboratory Bldg.1 Room110

3. NMR ⑨

300 MHz Solid-state NMR Spectrometer (Chemagnetics Infinity 300)
JEOL CMX-300 (Chemagnetics Infinity 300) (No. 4)



■ **Specifications/Features**

- OS: SunOS, Software: Spinsight Ver. 3.5.2
- Long-term VT (enables measurement without liquid nitrogen down to -50° C)

Probes:

- 4 mm Chemagnetics CPMAS Solids probe
  Maximum rotation speed ≤ 18 kHz
  Measurement temperature range: 35°C to 160°C
- 5 mm Chemagnetics CPMAS Solids probe
  Maximum rotation speed ≤ 10 kHz
  Measurement temperature range: 35°C to 160°C
- 2H wideline Chemagnetics probe
  Measurement temperature range: −35°C to 160°C

■ **Fee**

Analysis by user	Consult with staff.
Analysis by staff	Total: 1+2+3+4
	1. Basic rate: 4,000 yen
	2. Time-based rate: Less than 10 hours: 200 yen/30 min. Over 10 hours: 200 yen/hour
	3. Temperature-based rate: 1 degree up: 1,000 yen 1 degree down: 2,000 yen
	4. Measurement cell: 10,000 yen/sample

■ **Instrument location** Science, C Building,Room 115

3. NMR ⑩

400 MHz Solid-state NMR Spectrometer(Bruker Biospin AVANCE400WB)
Bruker Biospin AVANCE400WB(No. 119)

■ **Specifications/Features**

・OS：Windows7　Software：Topspin Ver.3.1

Probe

・4 mm Bruker WL Static solid Probe

Maximum rotation speed ≤ 20kHz

Measurement temperature range：-100 °C to 150°C

・4 mm Bruker H/X/Y CPMAS solid Probe

Maximum rotation speed ≤ 20kHz

Measurement temperature range：-100 °C to 150°C

・4 mm Bruker H/F/X CPMAS solid Probe

Maximum rotation speed ≤ 20kHz

Measurement temperature range：-100 °C to 150°C

■ **Fee**

Analysis by user	None
Analysis by staff	Total: 1+2+3+4
	1.Basic rate：2,000yen/sample
	2.Time-based rate：Less than 10 hours: 200yen/30min.
	Over 10 hours: 200yen/hour
	3Temperature-based rate：1degree up: 1,000 yen
	1degree down: 3000 yen
	4.Measurement cell：5,000 yen/sample

■ **Instrument location**　Science, C Building, Room113

3. NMR ⑪

600 MHz Solid-state NMR Spectrometer(Bruker BioSpin AVANCE III 600WB)
Bruker BioSpin AVANCE III 600WB(No. 20)

■ **Specifications/Features**

The Bruker BioSpin AVANCE III 600WB for state-of-the-art solid-state NMR has a wide-bore magnet, and enables measurement in the range from -140° C to +150° C.

It also enables measurement of items which were previously difficult, including protons, multi nuclei, and 2-dimensions.

The system can efficiently perform continuous treatment of multiple samples, and enables automatic, unmanned continuous measurement of multiple samples during the night or on holidays.

It is possible to prepare samples which are unstable in air or humidity, and the solid-state nuclear magnetic resonance system can be used with a wide range of samples.

■ **Fee**

Analysis by user	None
Analysis by staff	1,000 yen/hour However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: 2,500 yen/hour

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 104

4. Electron Spin Resonance ①

Electron Spin Resonance (ESR) Spectrometer(JEOL JES-FA200)
JEOL RESONANCE JES-FA200(No. 89)

■ **Specifications/Features**

Microwave unit: Basic frequency 8.75 - 9.65 GHz

Electromagnet: Variation range of magnetic field -10 to 1,300 mT

Cavity resonator (cavity): Resonance mode TE cylinder type

Variable temperature unit: Liquid helium variable temperature 2.5 to 400 K

Liquid nitrogen variable temperature 103 to 473 K

Attachments: Single axis goniometer for single-crystal samples

Electrochemical oxidation-reduction sample tube

Sample tube for aqueous solutions

■ **Fee**

Analysis by user: 1,000 yen/hour

(First-time users must undergo instruction in operation to perform analysis by user. Initial analysis by staff: 2,000 yen. Second and subsequent times: Additional fee: 2,000 yen when technical guidance is needed.)

Analysis by staff: 5,000 yen/hour

■ **Instrument location**: Science, G Building, Room 007

Electron Spin Resonance (ESR) Spectrometer(JEOL Resonance JES-TE200)
JEOL RESONANCE JES-TE200(No. 79)

■ **Specifications/Features**

This equipment is used to identify, structurally analyze and quantify radical molecular species.

■ **Fee**

Analysis by user: 500 yen/hour

An extra fee will be charged for temperature change measuring per 200 yen/hour.

Analysis by staff: None

■ **Instrument location**: Pharmaceutical Sciences, Room Joint Reuse B1-2 (Building 2, Room 102)

4. Electron Spin Resonance ②

X-band Electron Spin Resonance Spectrometer
JEOL RESONANCE JES X320(No. 123)

■ **Specifications/Features**

X-band cw spectrometer with a spectrum simulatiuon code, a time-resolved measurments unit and low tempertature measurment units (at liq, nitorogen temp. or liq. He temp).

■ **Fee**

Analysis by user	¥ 300 per hour for normal measuments at room temperature,
Analysis by staff	None

■ **Instrument location** Science,F Building, Room216

Electron Spin Resonance (ESR) Spectrometer(Bruker Biospin ELEXSYS E500)
Bruker Biospin ELEXSYS E500(No. 63)

■ **Specifications/Features**

Equipped with continuous wave, X-band electron spin resonance unit and temperature control (for liquid helium and liquid nitrogen).

Equipped with SHQ cavity and dielectric module resonator.

In addition to high-sensitivity detection of radicals and transition metals, the system can easily measure properties of radicals such as orientation, mobility and distance between radicals.

■ **Fee**

Analysis by user	500 yen/hour
	Technical guidance fee: 1,000 yen/hour
Analysis by staff	None

■ **Instrument location** Institute for Protein Research Room for NMR, 1st Floor, Analytical Instruments Facility

5. Magnetic Resoanace Imaging Apparatus ①

Magnetic Resonance Imaging (MRI) System for Small Animals
Bruker Biospin Avance II 500WB(No. 85)

■ **Specifications/Features**

11.7 T magnetic resonance imaging (MRI) system for small animals.
Enables MRI of small animals to the size of mice or rats.
Also can be used for cells, extracted tissues, and fixed samples, etc.

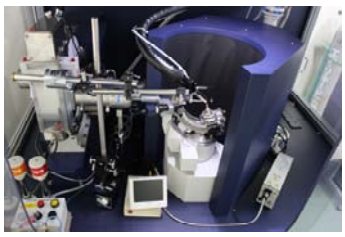
■ **Fee**

Analysis by user	None
Analysis by staff	50,000 yen/hour

■ **Instrument location** Open and Transdisciplinary Research Initiatives, OTRI
Immunology Frontier Research Center, 11.7T Room, MRI

6. X-ray Diffraction ①

X-ray Diffractometer for Structural Analysis of Ultramicrocrystals
Rigaku RAPID 191R/FR-E(No. 8)



■ **Specifications/Features**

X-ray source (can switch between the two wavelengths of Mo and Cu; currently Mo)
Equipped with curved IP (imaging plate) detector. Suitable for absolute structure determination of small organic molecules and crystals with a large lattice constant.
X-ray generator, etc.: Rigaku FR-E++ Super Bright (45 kV, 55 mA, 2.475 kW)
Rotor cathode (supports Cu and Mo wavelength switching)
Sample irradiation beam diameter: 0.21 mm
Imaging plate detector, etc.:
Curved IP detection area (750 mm × 382 mm), camera length (191 mm), measurement range (165°)
Dynamic range (1-1,000,000) AU (analog digital unit/pixels)
Goniometer section, etc.: 1/4 χ gonio
Spray-type cooling unit (-170° C to R.T)

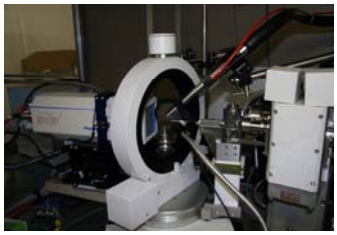
■ **Fee**

Analysis by user	2,400 yen/hour
Analysis by staff	4,800 yen/hour

■ **Instrument location** Science, C Building, Room 117

6. X-ray Diffraction ②

Single-crystal X-ray Diffractometer Equipped with Charge-Coupled-Device (CCD) Detector Rigaku AFC7R & MERCURY 2(No. 21)



■ **Specifications/Features**

CCD detector (semiconductor detector), high-intensity X-ray generator (60 kV, 300 mA, Mo, Cu)

Computer for control (Crystal Clear Ver. 1.4) and analysis

4-axis goniometer

Nitrogen gas spray-type cooling unit (-170° C to 200° C)

■ **Fee**

Analysis by user 500 yen/hour

Analysis by staff 500 yen/hour

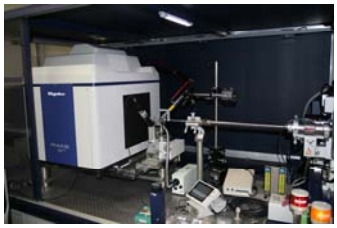
Separate fee of 1,000 yen/hour for operator

However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: Analysis by user: 1,000 yen/hour

Analysis by staff: 3,000 yen/hour

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 203

High Intensity Single-crystal X-ray Diffractometer with Flat /Curve IP Detector Rigaku FR-E & R-AXIS IV++(No. 74)



■ **Specifications/Features**

High-brightness X-rays (45 kV, 55 mA, Cu)

IP area (300 mm x 300 mm) x2

IP dynamic range (1 million cps or more)

Measurement control application: CrystalClear

Read resolution: 50, 100, 200 μm

Crystal sample size: Max. 300 μm

(size of crystal completely bathed in X-ray beam)

Spray cooling unit: Temperature range -180° C to 200° C

■ **Fee**

Analysis by user 1,200 yen/hour

Analysis by staff 3,600 yen/hour

However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: Analysis by user: 3,000 yen/hour

Analysis by staff: 9,000 yen/hour(only Curve IP)

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 203

6. X-ray Diffraction ③

Single-crystal X-ray Diffractometer
Rigaku VariMax RAPIDⅡ(No. 107)

■ **Specifications/Features**

Rotating anode sources

X-rayy source: Mo

Max rated output: 1.2kW (50kV-24mA)

Equipped with a confocal mirror system

Detector

Curved imaging plate

Dynamic range: 1～106

Camera length: 127.4 mm

Goniometer

1/4 goniometer

Low temperature device : -170 - R.T ℃

Software

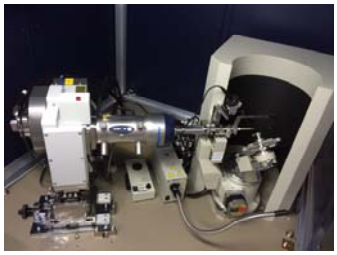
RAPID AUTO software for image data processing and structure refinement

■ **Fee**

Analysis by user	2,000 yen/hour
Analysis by staff	4,000 yen/hour

■ **Instrument location** Science,C Building, Room 116

Micro Area X-Ray Diffractometer
Rigaku RINT-RAPIDⅡ(No. 124)



■ **Specifications/Features**

Rotating anticathode sources

X-ray source: Mo or Cu (default: Mo)

Maximum rating output: 1.2kW (50kV-24mA for Mo)

Equipped with a confocal mirror system

Detector

Curved imaging plate (IP)

Dynamic range: 1050000 (20bit)

Camera length: 127.4mm

Goniometer: 5 axis (ω, ϕ: stepping motor driven)

Collimator size: ϕ10, 30, 50, 100, 300, 800 μm

Software

Measurement and data processing: RAPID/XRD (Windows7)

General-purpose 2D data processing: 2DP

Integrated powder X-ray analysis software: PDXL ver.2.1

■ **Fee**

Analysis by user	2000 yen/hour
Analysis by staff	None

■ **Instrument location** Science, F Building, Room 429

6. X-ray Diffraction ④

Powder X-ray Diffractometer
Rigaku RINT2000(No. 28)

■ **Specifications/Features**

Powder X-ray diffractometer. This enables data analysis, such as Rietveld conversion and lattice constant refinement, by using diffraction data. Integrated powder X-ray analysis software (PDXL) is installed, and it is also possible to carry out qualitative analysis and crystal structure analysis of powder samples, including unknown substances, using the crystal structure database of the ICSD (International Center for Diffraction Data).

■ **Fee**

Analysis by user	1,000 yen/hour (consultation is necessary in the case of joint research, etc.)
Analysis by staff	None

■ **Instrument location** Dentistry, C215

Multi-purpose X-ray Diffractometer(PANalytical X'pert PRO MPD)
PANalytical X'pert PRO MPD(No. 44)

■ **Specifications/Features**

ψ-axis precision: ±0.05°

Step size: 0.01 to 90°

Angular range: −5 to +95°

ϕ-axis precision: ±0.05°

Step size: 0.01 to 180°

Angular range: 0 to n×360°

Sample height: < 25 mm

Sweep rate: 12 deg/sec

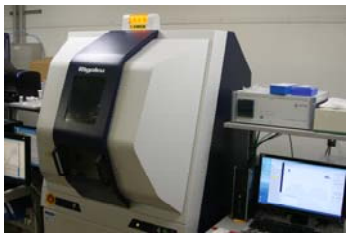
■ **Fee**

Analysis by user	500 yen/hour (Free for charge for users from the Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering)
Analysis by staff	None

■ **Instrument location** Engineering, A12 Building, Laboratory No. 3

6. X-ray Diffraction ⑤

Multi-purpose X-ray Diffractometer(Rigaku SmartLab)
Rigaku SMART LAB(No. 71)



■ **Specifications/Features**

This system uses X-ray diffractometry, and enables qualitative and quantitative analysis of powder samples, and measurement of thin film sample composition, orientation, film thickness, etc.

X-ray tube: Cu, Maximum rated output: 9 kW (tube voltage: 20-45 kV, tube current: 10-200 mA)

Goniometer section:

χ-axis angular range: -5 to +95°

Φ-axis angular range: 0 to 360°

Z-axis movement range: -4 to +1 mm

Rx, Ry: -5 to +5°

Detector: Scintillator (NaI), D/tex Ultra

Control software: SmartLab Guidance Ver. 1.5.5.6

Control and analysis computer (Windows 7)

System for high-temperature measurement (up to 900° C)

Switching between a focused optical system and a parallel beam optical system can be easily done using a slit, and it is possible to conduct data analysis such as Rietveld conversion of diffraction data, and refinement of the lattice constant.

*Analysis by user is only available for those who have finished the training course for SmartLab use jointly sponsored with the Comprehensive Analysis Center of the Institute of Scientific and Industrial Research.

■ **Fee**

Analysis by user	1,000 yen/hour However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: Analysis by user: 2,500 yen/hour
Analysis by staff	None

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 203

6. X-ray Diffraction ⑥

X-ray Diffractometer for Structural Analysis of Single Crystals under Low- Temperature and High-Pressure
Rigaku order-made system(No. 31)

■ **Specifications/Features**

X-ray generator: Mo rotating anticathode type (rated output: 18 kW)

Detector: Imaging plate (R-AXIS IV)

High-pressure generator: Diamond anvil type (ultimate pressure: about 100 GPa)

Freezer: Pulse tube type (attained temperature: approx. 10K)

■ **Fee**

Analysis by user	None
Analysis by staff	2,000 yen/hour (consultation is necessary in the case of joint research, etc.)

■ **Instrument location** Engineering Science,
Center for Science and Technology under Extreme Condition,
Extreme Research Complex (Combined Extreme Production Room)

7. Electron Microscope ①

Scanning Electron Microscope (SEM)(JEOL JSM-5310LV)
JEOL JSM-5310LV(No. 51)

■ **Specifications/Features**

Acceleration voltage: 30 kV

Equipped with digital image observation system (Digicapture)

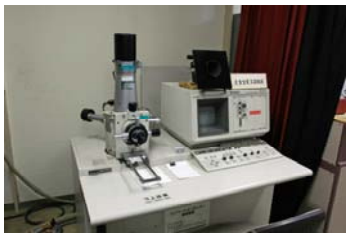
■ **Fee**

Analysis by user	5,000 yen/hour Free of charge for users from the Department of Mechanical Science and Bio engineering, Graduate School of Engineering Science
Analysis by staff	None

■ **Instrument location** Engineering Science, D Building,Room 103

7. Electron Microscope ②

Scanning Electron Microscope (SEM)(Hitachi High-Technologies S-2150)
Hitachi High-Technologies S-2150(No. 78)



■ **Specifications/Features**

Filament: Thermal electron gun W (tungsten)

Secondary electron resolution: 100 nm

Power: x30 - x200K

Acceleration voltage: 0.5-25 kV

■ **Fee**

Analysis by user	200 yen/hour However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: 500 yen/hour
Analysis by staff	None

■ **Instrument location** Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 102

Field Emission Scanning Electron Microscope (FE-SEM)(Hitachi High-Technologies SU6600)
Hitachi High-Technologies Analytical Variable Pressure FE-SEM SU6600(No. 58)

■ **Specifications/Features**

Supports each observation mode: high vacuum and low vacuum

Secondary electron resolution: 1.3 nm at high vacuum, 3 nm at low vacuum

Power: x10 - x600,000, digital camera specifications

Equipped with cool stage (normally not provided).

When equipped with standard stage, observation can be done by inclining the stage.

Has a number of analysis tools for length measurement, etc.

■ **Fee**

Analysis by user	1,500 yen/hour
Analysis by staff	3,000yen/hour

■ **Instrument location** Science, A Building, Room 324

7. Electron Microscope ③

Field Emission Scanning Electron Microscope (FESEM)(Hitachi High-Technologies S-4200)
Hitachi High-Technologies S-4200(No. 43)

■ **Specifications/Features**

Power: x20 - x500,000

Resolution: 5 nm (1 kV), 1.6 nm (15 kV)

■ **Fee**

Analysis by user	500 yen/hour Free for charge for users from the Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering
Analysis by staff	None

■ **Instrument location** Engineering, A12 Building, Laboratory No. 3

Energy-dispersive X-ray Spectrometer
HORIBA EMXA-5770(No. 42)

■ **Specifications/Features**

Detected elements: Boron (Z=5) to Uranium (Z=92)

Energy resolution: < 144 eV

■ **Fee**

Analysis by user	1,000 yen/hour Free for charge for users from the Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering
Analysis by staff	None

■ **Instrument location** Engineering, A12 Building, Laboratory No. 3

7. Electron Microscope ④

Field Emission Scanning Electron Microscope (FESEM) with Energy-dispersive X-ray Spectrometer (EDS)(JEOL LSM-6335, JED-2300F)

JEOL JSM-6335, JED-2300F(No. 64)

■ **Specifications/Features**

Field emission scanning electron microscope (JSM-6335)

Secondary electron image resolution: 1.5 nm (15 kV), 5.0 nm (1 kV)

Power: x10 - x500,000

Acceleration voltage: 0.5-30 kV

EDS element analysis system (JED-2300F)

Energy resolution: 129 eV or less (10 m2)

Measured elements: Be-U, uses no liquid nitrogen

In addition, Ion Milling System has been introduced which enables surface and cross-section milling. This allows sophisticated sample pre-treatment of a wide variety of samples, including metals, devices, and polymer composite materials.

■ **Fee**

Analysis by user	600 yen/hour However, Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building, and other on-campus company-affiliated persons: Analysis by user: 1,500 yen/hour
Analysis by staff	None

■ **Instrument location** Institute of Scientific and Industrial Research, S Building, Room 107-1

7. Electron Microscope ⑤

Field Emission Scanning Electron Microscope (FE-SEM) with Energy-dispersive X-ray Spectrometer (EDS)(JEOL JSM-7600F)
JEOL JSM-7600F(No. 98)

■ **Specifications/Features**

Secondary electron resolution: 1.0 nm @ 15 kV, 1.4 nm @ 1 kV

Observation power: x25 - x1M

Acceleration voltage: 0.1-30 kV

Detectors: Secondary electron detector,
retractive reflection electron detector, EDS

The system has a field emission electron gun and a semi-in-lens, and thus is capable of producing high-intensity, high-resolution observation results.

By using the gentle beam mode, it is possible to observe the surface at ultra-low energy (several hundred eV).

The system can perform simultaneous observation and capture of secondary electrons, reflected electrons, topographic imaging, and composition imaging using the retractive reflection electron detector.

By using a TEM grid holder, it is possible to easily observe samples in the same sampling lot as that used for TEM observation.

■ **Fee**

Analysis by user	3,000 yen/hour
Analysis by staff	6,000 yen/hour
	※For other supplies provided in the analysis laboratories, users should pay according to the amount used.

■ **Instrument location** Science, Interdisciplinary Research Building 2F, Microscope Room

Transmission Electron Microscope (TEM)(Hitachi High-Tech. H-7650)
Hitachi High-Technologies H-7650(No. 59)

■ **Specifications/Features**

Acceleration voltage: 40-120 kV

Resolution: 0.2 nm (lattice image)

Monitor power: x9.5 million (photography with digital camera)

Does not support tomography.

■ **Fee**

Analysis by user	1,500 yen/hour
Analysis by staff	3,000yen/hour

■ **Instrument location** Science, A Building,Room 322

7. Electron Microscope ⑥

Transmission Electron Microscope (TEM)(JEOL JEM-2100)
JEOL JEM-2100(No. 99)

■ **Specifications/Features**

Resolution: Particle image 0.23 nm, Lattice image 0.14 nm

Observation power: x50 - x1.5M

Acceleration voltage: 50-200 kV

The system uses a LaB6 filament allowing long-term stable use of the electron gun (having a long lifetime).

Enables crystal lattice observation at high spatial resolution.

Data can be captured and video footage can be taken in a short time using a CCD camera.

In linkage with an SEM-EDS, it is possible to acquire internal information, element composition and other data for samples in the same sampling lot.

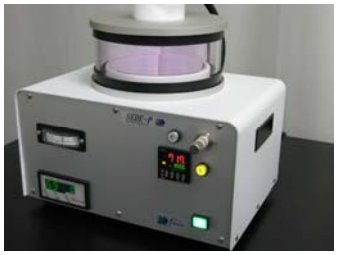
■ **Fee**

Analysis by user	3,000 yen/hour
Analysis by staff	6,000 yen/hour
	For other supplies provided in the analysis laboratories, users should pay according to the amount used

■ **Instrument location** Science, Interdisciplinary Research Building 2F, Microscope Room

8. Electron microscopy sample preparation ①

wide diameter soft plasma etching device
Meiwa forsis co., LTD SEDE-P(No. 98 - 2)



■ **Specifications/Features**

Electric glow discharge,

The device can generate large diameter plasma with effective diametephi of 148mm.

available gas: atmospheric air

SEM (No.98-1)allows observation of living specimens in combination with plasma etching device (No.98-2)

The device enables the following techniques.

1.Living-SEM (ref. Microscopy,2014,295-300)

2.Hydrophilizattion of TEM grids on other surfaees with hydrophohic characteristics.

3. Plasma cleaning of the surfaceof a material (for removal of contaminants doposited on the surfue material)

■ **Fee**

Analysis by user	sample × condition × 100yen
Analysis by staff	None

■ **Instrument location** Science, Interdisciplinary Research Building 2F, Microscope Room

8. Electron microscopy sample preparation ②

Dual Beam Machining and Observation Apparatus
U.S.A.FEI XL830(No. 108)

■ **Specifications/Features**

Electron Beam performance: Voltage range 200V to 30kV, Ion Beam Performance: Operating voltage of 5kV to 30kV, equipped with EDX system, micromanipulators, equipped to deposit either metal (Pt, W) or insulator (combined tetraethyl orthosilicate (TEOS) and compatible with 8-inch substrates.

FIB nanoprocessing, SEM observation and chemical composition characterization can be carried out continuously or intermittently using dual beam (FIB and electron beam) system.

Nanoscale patterning can be achieved via FIB etching or FIB-driven deposition of metals (Pt and W). Measurement of electrical properties and TEM sample preparation can be done using micromanipulator within the chamber.

■ **Fee**

Analysis by user	10,000 yen/hour
Analysis by staff	None

■ **Instrument location** Graduate School of Engineering Science,Center for Science and Technology under Extreme Conditions,112

High Vacuum Coating System
Leica EM-MED 020(No. 60)

■ **Specifications/Features**

Specifications optimized for applying the rotary shadowing method. Rapid evacuation.

The amount of vapor deposition is measured and displayed as a numerical value, and thus rotary shadowing is performed without requiring a high level of skill.

■ **Fee**

Analysis by user	500 yen/hour Technical guidance fee: 1,000 yen/hour Free of charge for users from the Department of Biological Sciences, Graduate School of Science
Analysis by staff	None

■ **Instrument location** Science, A Building, Room 318

8. Electron microscopy sample preparation ③

High Pressure Freezing System
Leica EM-HPM100(No. 55)

■ **Specifications/Features**

Cooling speed: 100,000 K/sec

Freezing is performed under high pressure (2,100 bar).

Operation is almost entirely automated.

An 8-mm sample stand can be used as an option.

■ **Fee**

Analysis by user	500 yen/hour Technical guidance fee: 1,000 yen/hour Free of charge for users from the Department of Biological Sciences, Graduate School of Science
Analysis by staff	None

■ **Instrument location** Science, A Building, Room 318

Freeze Substitution System
Leica EM-AFS2(No. 54)

■ **Specifications/Features**

Temperature range: −140° C to 70° C

Liquid nitrogen consumption: 0.3 L in 5 days

The system is not equipped with a freeze substitution processor (FSP) for automating the substitution process.

(Tasks such as substitution must be performed manually.)

Easy setting of the temperature control program.

Temperature control is fully automated.

This system is also equipped with a kit to promote polymerization of resins with UV.

■ **Fee**

Analysis by user	500 yen/hour Technical guidance fee: 1,000 yen/hour Free of charge for users from the Department of Biological Sciences, Graduate School of Science
Analysis by staff	None

■ **Instrument location** Science, A Building, Room 318

9. Surface Analysis ①

X-ray Photoelectron Spectrometer (XPS)
Shimadzu KRATOS AXIS-165x(No. 94)

■ **Specifications/Features**

By spectrally dispersing photoelectrons produced when the surface of a solid is irradiated with X-rays in an ultra-high vacuum, it is possible to obtain information at the extreme surface layer of the solid (a few tens of angstroms in depth), and to qualify and quantify the composition of the solid surface. Al/Mg and monochrome Al (monochromator) are provided as X-ray sources for excitation, and these can be used to suit the application. In addition, the instrument can analyze changes in composition in the depth direction by using the included sputtered ion gun, and repeating analysis after thinly stripping off the surface.

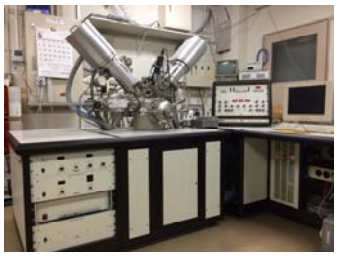
■ **Fee**

Analysis by user　6,000 yen/hour

Analysis by staff　6,000 yen/hour
(The fee is the basic rate. An extra fee will be charged depending on the analysis content and difficulty.)

■ **Instrument location**　Office for University-Industry Collaboration, A Building, A-004

Secondary Ion Mass Spectrometry(SIMS)
ATOMIKA SIMS410(No. 122)



■ **Specifications/Features**

the elements in solide sample are identidied by the mass spectrometry analysis of the second ion produced by the irradiation of the ion beam (primary ion)
depth direction analysis of the impurities of semiconductors or element diffusion analysis in a multilayered membrane

■ **Fee**

Analysis by user　2,000 yen/h
5,000 yen /h
for On-campus company-affiliated persons from facilities such as the Institute of Scientific and Industrial Research's Incubation Building and Techno Alliance Building

Analysis by staff　None

■ **Instrument location**　The Institute of Scientific and Industrial Research, Comprehensive Analysis Center, Room 102

10. Morphological Observation ①

Atomic Force Microscope (AFM)
Keyence VN-8000, VN-8010(No. 96)

■ **Specifications/Features**

The main feature of this system is that measurements can be obtained under normal atmospheric conditions and therefore it is easy to operate.

Sample size: Approx. 7 cm x 7 cm, Height: 15 mm

Stage movement range: X-Y-Z 20 mm

Observation range: X-Y 200 nm - 200 μm, Z ±10μm

Vertical (Z) resolution: 0.3 nm

Observation mode: Contact, DFM, SS

■ **Fee**

Analysis by user	1,000 yen/hour
Analysis by staff	1,000 yen/hour

(The fee is the basic rate. An extra fee will be charged depending on the analysis content and difficulty.)

■ **Instrument location** Office for University-Industry Collaboration, A Building, A-004

shimazu SPM-9500J3(No. 125)

■ **Specifications/Features**

SPM-9500J3 can be scan sample surfaces with an extremely sharp probe to observe their three-dimensional image or local properties at high magnifications.

■ **Fee**

Analysis by user	1000 JPY/hour
Analysis by staff	None

■ **Instrument location** Graduate School of Dentistry C-215

11. Spectroscopic Analysis Apparatus ①

Micro-stopped-flow Fluorescence Spectrophotometer
Applied Photophysics SX17MV(No. 33)

■ **Specifications/Features**

This instrument enables measurement of high-speed reactions between biomolecules using methods such as absorbance, fluorescence, and circular dichroism.

It is possible, using these methods, to detect high-speed reactions which occur over periods ranging from 1/1000 of a second to a few minutes.

No problems occur, even if solutions with high and low salt concentration are mixed, and it is possible to analyze the renaturation and denaturation of protein.

■ **Fee**

Analysis by user	2,000 yen/day (Contact us about the fee for analysis by an assistant.)
Analysis by staff	3,000 yen/hour

■ **Instrument location** Science, D Building, Room 103

Stopped-flow Rapid-scan Spectroscopy System
Unisoku RSP1000D(No. 11)

■ **Specifications/Features**

Laser source:

Surelite I Nd-YAG made by HOYA Continuum (5 ns pulse)

System enabling dye laser spectroscopy:

Rapid-scan photomultiplier spectroscope made by Unisoku Co., Ltd.

(spectroscope: Unisoku MD200)

Photomultiplier: Photomultiplier made by Unisoku (nsec, sub-nsec, μsec)

Tektronix digital oscilloscope

Multi-channel photometry section: MOS type, high sensitivity

Photodiode array (scan 1 msec)

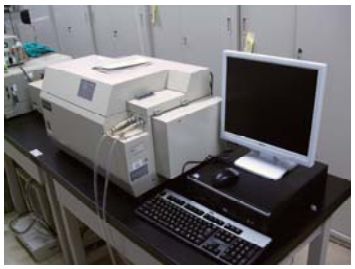
■ **Fee**

Analysis by user	None
Analysis by staff	1,500 yen/hour

■ **Instrument location** Engineering, C4-627

11. Spectroscopic Analysis Apparatus ②

Circular Dichrometer (Jasco J-805)
Jasco J-805 (No. 40)



■ **Specifications/Features**

Measured wavelengths: 185-400 nm (150 W Xe Lamp)

Resolution: <1 nm

■ **Fee**

Analysis by user	200 yen/hour
Analysis by staff	None

■ **Instrument location** Engineering Science, C Building, Room 522

Circular Dichrometer (Jasco J-720W)
Jasco J-720W (No. 32)

■ **Specifications/Features**

This instrument enables measurement of the circular dichromatic spectrum from 170 nm to 800 nm, and measurement of the structure of nucleic acids, proteins and DNA.

For example, it is possible to estimate the percentages of protein secondary structures (α-helix, β-sheet), and analyze the presence/absence of denaturation. In addition, it is also possible to evaluate phenomena such as formation of the double-helix of DNA. The minimum necessary amount of sample is 10 μg.

■ **Fee**

Analysis by user	2,000 yen/day (Contact us about the fee for analysis with an assistant.)
Analysis by staff	3,000 yen/hour

■ **Instrument location** Science, D Building, Room 103

11. Spectroscopic Analysis Apparatus ③

Circular Dichrometer(Jasco/Oxford Instruments J-720W/MS4000)
Jasco/Oxford Instruments J-720W/MS4000(No. 81)

■ **Specifications/Features**

Measurement wavelengths: 170-1,000 nm

Spectrum width: 0.2-2 nm

CD scale: 1-1,000 m° / full-scale

Absorbance: 0-5 ABS

Magnetic field: 0-7 T

Temperature: 4.2-300 K

This system is for performing magnetic circular dichroism spectroscopy. It employs a technique for obtaining information relating to the magnetic properties and electron structure of the photoexcited states of systems in which light and magnetic properties are correlated, such as magnetic metal ions in inorganic solids, π-conjugated compounds, and metal complexes.
The system enables application of magnetic fields up to 7 T, and temperature can be adjusted between 1.5 K and 300 K. The system allows the user to control the temperature without applying a magnetic field.

■ **Fee**

Analysis by user	None
Analysis by staff	30,000 yen/day or 120,000 yen/session (4-5 consecutive days of operation is available as one session. For use for 1 day to 3 days please discuss the schedule with the administrative chair.)

■ **Instrument location** Science, G Building, Room 310

11. Spectroscopic Analysis Apparatus ④

Laser Raman Spectrometer (Jasco NR-1800)
Jasco NR-1800 (No. 72)

■ **Specifications/Features**

Equipment for measuring vibrational energy in structural chemistry research on molecules.

Enables measurement of the chemical structure which is the foundation of research fields at the molecular level.

Since the system has lasers with multiple wavelengths, it can induce the resonance Raman effect.

Kr laser: 406.7 nm, 413.1 nm

He-Cd laser: 441.6 nm

Triple spectroscope (1 cm-1/pixel)

Detector: CCD detector (maximum sensitivity near 400 nm)

■ **Fee**

Analysis by user	1,000 yen/hour
Analysis by staff	2,000 yen/hour

■ **Instrument location** Pharmaceutical Sciences, Building 1, Room 503

Laser Raman Spectrometer Jasco(NR-1800)
Jasco NR-1800(No. 82)

■ **Specifications/Features**

Max. resolution: 0.2 cm-1, Wavelength precision: ±1 cm-1

Ar laser: 514.5 nm, 488.0 nm, 457.9 nm

He-Ne laser: 632.8 nm

Semiconductor laser: 405 nm, 532 nm, 660 nm

This is a Raman spectrometer for the visible range, equipped with a CCD and a photomultiplier as detectors.

The system is equipped with a cryostat, and can perform measurement from room temperature to ultra-low temperatures (approximately 5 K).

■ **Fee**

Analysis by user	None
Analysis by staff	Basic rate: 5,000 yen/hour An extra fee is required for low temperature measurement. Contact us about the fee.

■ **Instrument location** Science, c Building, Room 227

11. Spectroscopic Analysis Apparatus ⑤

Fourier Transform Infrared (FT-IR) Spectrometer(Jasco FT/IR-6100)
Jasco FT/IR-6100(No. 83)

■ **Specifications/Features**

- Measurement wave number range: 7,800-350 cm-1,
  Maximum resolution: 0.5 cm-1
- Measurement can be done using KBr tablets, Nujol mull method or Fluorolube method. It is also possible to perform polarized measurement using ATR.
- Equipped with cryostat. Measurement can be done from room temperature to ultra-low temperatures (approximately 5 K).

With the coupling of an FTIR spectrometer to an infrared microscope, the system is able to examine microscopic areas of materials down to the micrometer level.
FTIR imaging allows the visualization of chemical information on the spatial distribution about the constituents.

The following are examples of application areas for FT-IR microscopy.
・High-sensitivity measurement of a thin film sample on a metal substrate
・identification and imaging of trace contaminants
・Analysis of a thinner multi-layer film having a thickness of about 10 micrometers or less

The following three additional new features were incorporated.

(1) DLATGS detector with no need for liquid nitrogen cooling and spectral acquisition to below 400 cm-1 (spectral range that is inaccessible with the MCT detector)
(2) Coupling a Ge ATR objective with an infrared microscope provides exceptional sensitivity and spatial resolution for micro sample analysis, which cannot be achieved with macro-ATR analysis. Furthermore, this technique can be also applied for surface characterization of samples (metal substrates, etc.) that are not suitable for transmission measurements.
(3) Diamond cell used to be compressed and flattened to a uniform thickness for FT-IR analysis of micro samples in transmission mode using a FT-IR microscope.

■ **Fee**

Analysis by user	2,500 yen/hour (Fee for technical guidance: 1,000 yen/hour) (Not possible for low temperatures)
Analysis by staff	Basic rate: 5,000 yen/hour An extra fee is required for low temperature measurement. Contact us about the fee.

■ **Instrument location** Science, c Building, Room 227

11. Spectroscopic Analysis Apparatus ⑥

FTIR Spectrometer Attached to IR Microscope
Thermo Fisher Scientific (former VG) Magna750, Nic-plan(INFRARED MICROSCOPE)(No. 45)

■ **Specifications/Features**

Enables analysis of light transmittance and reflectance in the mid-infrared wavelength range (800-4,000 cm-1; the range may differ somewhat depending on the sample). The instrument is also equipped with an infrared microscope, so it also enables infrared spectroscopic analysis in the micro range (up to approximately 50 μm2).

■ **Fee**

Analysis by user	1,000 yen/day
Analysis by staff	None

■ **Instrument location** Engineering, A14 (Accelerator Experiment Building), Courtyard Lab.

Absolute Photoluminescence Quantum Yield Spectrometer
Hamamatsu Photonics Quantaurus-QY(C11347-01)(No. 92)

■ **Specifications/Features**

Measures the absolute photoluminescence quantum yield of a photoluminescent material using the photoluminescence (PL) method

PL measured wavelength range: 300-950 nm

Excitation wavelength: 250-850 nm

Sample types: Thin film, powder, liquid

Measurement at room temperature only

■ **Fee**

Analysis by user	1,000 yen/hour
Analysis by staff	1,000 yen/hour
	(The fee is the basic rate. An extra fee will be charged depending on the analysis content and difficulty.)

■ **Instrument location** Office for University-Industry Collaboration, A Building, A-004

11. Spectroscopic Analysis Apparatus ⑦

UV-Vis-NIR Spectrophotometer
HITACHI (No. 116)

■ **Specifications/Features**

This instrument permits determination of spectral transmittance and reflectance (at incident angle of 5degrees) of sample at UV and Vis-NIR region from 240nm to 2600nm.

Light sources are WI lamp and Deuterium lamp, and detectors are integrating sphere, photomultiplier tube, and PbS. Combination of them is controlled automatically depending on wavelength of light.

Line width of diagnostic light is adjustable by changing width of exit slit of monochromator inside this instrument from 0.1nm to 8.0 nm.

This instrument also permits alteration of transmittance or reflectance from moment to moment.

Optional equipment permits determination of spectral reflection at arbitrary point on 8-inch wafer at incident angle of 5degrees. Ultra broadband dielectric mirror as reference permits determination of absolute reflectance from 400nm to 1200nm.

Using polarizer permits polarization-dependent transmittance and reflectance from 400nm to 700nm.

Measured data are recorded as ASCII data, and user takes them directly from desktop computer by USB flash memory. Operating system of computer is Windows XP, and don't introduce a virus into computer by your USB flash memory, please.

■ **Fee**

Analysis by user	1,000yen/hour
Analysis by staff	3,000yen/hour

■ **Instrument location** Graduate School of Engineering
Room M1-518, 5F, M1 Building

11. Spectroscopic Analysis Apparatus ⑧

Spectrofluorometer
HORIBA　FluoroMax-4(No. 117)

■ **Specifications/Features**

Spectrometers: Plane-grating Czery-Turner design、

Excitation & Emission: 200-950 nm, Bandpass: 0-30nm,

Scan speed: 80 nm/s, Integration time: 1 ms to 160 s,

Photomultiplier range: 200-850 nm,

Emission detector: photon counting, S/N ratio: 3000:1 (steady-state mode),

Computer-control with FluorEssenceTM software,

■ **Fee**

Analysis by user　1,000 yen/day

Analysis by staff　None

■ **Instrument location**　Science, A Building, Room 217/219

12. Thermal Analyzers ①

High-sensitivity Isothermal Titration Microcalorimeter
MicroCal VP-iTC/1000(No. 16)

■ **Specifications/Features**

This system is for obtaining thermodynamic information on bonds through high-sensitivity measurement of the minute amounts of heat produced and absorbed when there is interaction between molecules.

For higher sensitivity analysis of even more minute amounts, please use the Ultrahigh-sensitivity Isothermal Titration Microcalorimeter (No. 66).

■ **Fee**

Analysis by user　500 yen/hour

(Contact us about the fee for analysis with an assistant.)

Analysis by staff　3,000 yen/hour

■ **Instrument location**　Science, D Building, Room 103

12. Thermal Analyzers ②

Ultrahigh-sensitivity Isothermal Titration Microcalorimeter
MicroCal iTC200(No. 66)

■ **Specifications/Features**

Enables measurement with a cell capacity of 200 μl (VP-ITC ratio 1/7).
Measurement time is reduced to 15-30 minutes (VP-ITC ratio 1/2-1/4).
Measurement temperature range 2° C to 80° C, cell volume 200 μl, titer 0.1-40 μl

[Features] In the field of molecular biology, this instrument enables observation of bonding of proteins and ligands while in the solution state, and calculation of the dissociation constant of proteins and ligands.
In addition, it measures changes in calorific value accompanying bonding, and thus it enables analysis of thermodynamic processes such as changes in enthalpy.
Uses are not limited to the field of molecular biology. Even in the field of chemistry and physics, it is possible to measure a wide range of reactions, including association of compounds and polymerization of molecules.
Among equipment currently on the market, this instrument has the best sensitivity, and both the sample amount and measurement time are greatly improved compared to previous generation systems.

■ **Fee**

Analysis by user	500 yen/hour (Contact us about the fee for analysis with an assistant.)
Analysis by staff	3,000 yen/hour

■ **Instrument location** Science, D Building, Room 103

Nano-Differential Scanning Calorimeter (Nano-DSC)
CSC Nano-DSC(No. 17)

■ **Specifications/Features**

This system is for varying the temperature of a sample, and quantitatively measuring the outflow and inflow of heat produced at that time.
This enables, for example, analysis of thermal denaturation of protein, and reactions where two chains of DNA become one chain due to temperature changes.

■ **Fee**

Analysis by user	500 yen/hour (Contact us about the fee for analysis with an assistant.)
Analysis by staff	3,000 yen/hour

■ **Instrument location** Science, D Building, Room 103

12. Thermal Analyzers ③

Thermal Analysis System (TG-DTA、DSC、TMA)
Rigaku Thermo Plus EVO Ⅱ(No. 95)

■ **Specifications/Features**

Differential scanning calorimeter (DSC)

Working temperature range: -125° C to 450° C,

Max. rate of temperature rise: 100° C/min

Thermomechanical analysis (TMA)

Compressive load method: Fixed load, constant velocity load, sin wave periodic load

Working temperature range: Room temperature to 1,350° C,

Max. rate of temperature rise: 100° C/min

Thermogravimetry-Differential thermal analyzer (TG-DTA)

Working temperature range: Room temperature to 1,350° C,

Max. rate of temperature rise: 100° C/min

Max. amount of sample: 1 g

DSC, TMA, and TG-DTA can be used simultaneously.

Measurement atmosphere: Air, N2 gas

■ **Fee**

Analysis by user — 1,000 yen/hour
(Contact us about the fee for analysis with an assistant.)

Analysis by staff — 1,000 yen/hour
(The fee is the basic rate. An extra fee will be charged depending on the analysis content and difficulty.)

■ **Instrument location** — Office for University-Industry Collaboration, A Building, A-004

13. Bio-related analytical instrument ①

Fluorescence Microscope
Zeiss Axio Observer, D1 equivalent(No. 80)

■ **Specifications/Features**

Fluorescence microscope equipped with AxioCam HRm high-sensitivity monochrome CCD camera.

The following filters can be used:

Filter Set 01, Ex BP365/12 BS FT394 Em LP397 DAPI, AMCA

Filter Set 15, Ex BP546/12 BS FT580 Em LP590 Rhodamine, Alexa 546

Filter Set 09, Ex BP450-490 BS FT510 Em LP515 FITC, Acridin Orange, GFP

The attached AxioVision is used for photography and image analysis.

■ **Fee**

Analysis by user	500 yen/hour
Analysis by staff	None

■ **Instrument location** Immunology Frontier Research Center, 3F Room 309

Real-time Fluorescence Lifetime Imaging System
Hamamatsu Photonics Nikon Aqua Cosmos RATIO Basic System(No. 37)

■ **Specifications/Features**

This system enables high-sensitivity detection of phenomena such as cellular response, by capturing changes in ion concentration and enzyme activity of cell and tissue samples.

■ **Fee**

Analysis by user	1,500 yen/hour (Free of charge for users from the Division of Medical Pharmacy, Graduate School of Pharmaceutical Sciences)
Analysis by staff	None

■ **Instrument location** Pharmaceutical Sciences, 2 Building 1F, B1-101

13. Bio-related analytical instrument ②

XL-I Analytical Ultracentrifuge
Beckman Coulter Optima XL-1(No. 2)

■ **Specifications/Features**

By using analytical ultracentrifugation, it is possible to observe the form of biopolymers such as proteins and DNA under physiological conditions. This system can measure the form and molecular weight of single molecules and supramolecular complexes, and also test their purity. As a more sophisticated application, it enables observation of interactions between biopolymers (whether or not complexes are formed).

■ **Fee**

Analysis by user　None

Analysis by staff　500 yen/hour

■ **Instrument location** Institute for Protein Research, 519

XL-A Analytical Ultracentrifuge
Beckman Coulter Optima XL-A(No. 10)

■ **Specifications/Features**

Xenon laser pulsed light source

Titanium rotor: 1,000-60,000 rotations/minute

Spectroscope: 190-800 nm

UV detector: 0-1.5 OD

Measurement temperature: 0° C to 40° C

PC and data automatic input/analysis program

■ **Fee**

Analysis by user　None

Analysis by staff　500 yen/hour

■ **Instrument location** Institute for Protein Research, 519

BECKMAN COULTER Optima L-90K(No. 126)

■ **Specifications/Features**

Optima L-90K Ultracentrifuges enable you to perform more separations in less time. Perfect for applications such as high-purity plasmid DNA, subcellular particles and virus isolations, this versatile floor model operates with a broad range of superb rotors, including zonal and continuous flow for large-volume separations.

■ **Fee**

Analysis by user　500/hour

Analysis by staff　None

■ **Instrument location** Graduate School of Pharmaceutical Sciences

13. Bio-related analytical instrument ③

Fully Automated Nucleic Acid Extraction System
KURABO NA-1000(No. 47)

■ **Specifications/Features**

This system can fully automatically perform gene extraction from tail solution, in order to investigate the mouse genotype.
In addition, it can process 40 samples simultaneously.
It is also useful for shortening time spent on analysis of genetically engineered animals.

■ **Fee**

Analysis by user	1,000 yen/10 samples (minimum badge)
Analysis by staff	None

■ **Instrument location** Pharmaceutical Sciences, 2 Building, Room 402

Genetic Analyzer for DNA Sequencing and Fragment Analysis (LongCapillary_No.1)
Applied Biosystems ABI PRISM 310Genetic Analyzer(No. 1)

■ **Specifications/Features**

This system is a DNA sequencer that uses capillary electrophoresis.
It automatically fills the capillary tube with special polymer instead of the conventional acrylamide, and then performs sequencing and fragment analysis.
There is no need for troublesome and time-consuming preparation of slab gel, as was previously done, and no variation in results due to slab gel quality.
Analysis is carried out for each sample. In terms of the analysis time for a single sample, 500-700 bp can be sequenced in 3 hours, and 48 samples can be analyzed if an auto-sampler is used.

■ **Fee**

Analysis by user	None
Analysis by staff	200 yen/analysis (Free of charge for users from the Division of Physiological Sciences, Division of Pathophysiology and Therapeutics, Division of Preventive and Environmental Medicine, Division of Internal Medicine, and Division of Surgical Medicine)

■ **Instrument location** Medicine, Center for Medical Research and Education, D91-08

13. Bio-related analytical instrument ④

Surface Plasmon Resonance(SPR)
GE Healthcare Biacore 3000(No. 105)

■ **Specifications/Features**

Surface plasmon resonance (SPR) is a label-free method that facilitates the elucidation of real-time kinetics of molecular interactions between biomolecules (proteins, nucleic acids, peptides, carbohydrates, lipids and other biomolecules).

SPR can be used to various applications such as evaluation of steady state affinity, evaluation of binding kinetics and nalysis of dissociation kinetics.

■ **Fee**

Analysis by user	500yen/hour
Analysis by staff	None

■ **Instrument location** Science, A Building, Room 311

13. Bio-related analytical instrument ⑤

MicroArray Analysis Platform
Affymetrix(No. 111)

■ **Specifications/Features**

This platform can be used in processes of gene sequencing and gene expression analysis using DNA microarray (DNA chip).
The hybridization, washing, staining and scanning processes can be performed using this system.

System Components
Hybridization: GeneChip Hybridization Oven 645
Washing and Staining: GeneChip Fluidics Station 450
Scanning: GeneChip Scanner 3000 7G System & GeneChip AutoLoader
Specifications
Scanner
Scan Rate: Typical times: 5 minutes for a 49-format array at 2.5 μm pixelation
"Sensitivity: <0.5 chromophore equivalents/μm2 (CPSM) at a signal-to-noise ratio of 2:1 at wavelengths appropriate to R-Phycoerythrin"
Excitation: 532 nm, 200 μW
Emission Filters: 570 nm, Long-Pass
Detector: Meshless Photomultiplier Tube, Red Enhanced
Displayed/Saved Dynamic Range: 16-bit, (65535:1)
Resolution Scanning at Pixelations: 2.5 μm ～ 0.5 μm
This platform can analyze all GeneChip® probe arrays for gene expression analysis and DNA SNP analysis.
"48-array removable carousel for unattended loading and unloading of experiments."
Oven
Oven Set Point Range: 30°C – 70°C

■ **Fee**

Analysis by user	6,000 yen/day
Analysis by staff	None

■ **Instrument location** Science, D Building, room 103

13. Bio-related analytical instrument ⑥

Flow Cytometer
BD FACS Calibur(No. 115)

■ **Specifications/Features**

Laser source : Cooled Arlaser (Excitation wavelength : 488 nm)
Detection of fluorescence wavelength : near 530 nm, near 585 nm,
Fluorescent dye etc. :FITC, PE, PI, etc
Sample tube for analysis : 12 mm x 75 mm
Analysis system : Mac-Pro
Method for retrieving data: CD-R (For antivirus)

■ **Fee**

Analysis by user	3000yen/hour Free of charge for users from Graduate School of Pharmaceutical Sciences
Analysis by staff	None

■ **Instrument location** Pharmaceutical Sciences, 1st building, 1st floor,Room 112

14. Liquid Chromatography ①

Fast Protein Liquid Chromatography (FPLC) System
GE Healthcare AKTA explorer 10Sfrac-950(No. 34)

■ **Specifications/Features**

This instrument performs protein refining and biomolecule analysis.
A column is mounted, biomolecules are separated, and the eluate is analyzed in real-time using absorbance. Detection sensitivity for absorbance is high, and thus it is also possible to detect low-concentration biomolecules. The instrument can be used in a wide range of separation and analysis tasks for proteins, DNA and other biomolecules.

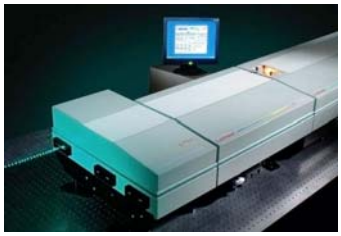
■ **Fee**

Analysis by user	3,000 yen/day (Contact us about the fee for analysis by an assistant.)
Analysis by staff	None

■ **Instrument location** Science, A Building, Room 311

15. Laser equipment ①

OPO Pulse Laser System
U.S.A. Continuum Powerlite9010 + Sunlite-EX + FX-1(No. 109)



■ **Specifications/Features**

●Powerlite Precision 9010 (Pulsed YAG Laser (customized for OPO Excitation))

Laser safety class: 4

This laser is loaded with an injection seeder (stabilized infrared laser diode).

Pulse repetition: 10 Hz or single shot

Output (max): 350mJ/pulse@355nm (3-5nsFWHM), 700mJ/pulse@532nm (4-6nsFWHM), 1400mJ/pulse@1064nm (5-7nsFWHM)

Beam diameter: about 8mm

Linewidth: 0.003cm-1 (injection seeded)

Pulse shape: gaussian (injection seeded)

●Sunlite-EX (optical parametric oscillator and optical parametric amplifier)

Output: 445-1750nm (5-55mJ/pulse, 3-6nsFWHM)

Linewidth: 0.075cm-1

●FX-1 (frequency doubler or UV generator)

This system double the frequency of Sunlite-EX output.

Output: 225-445nm (2-9mJ/pulse, 3-5nsFWHM)

※Actual wavelength and pulse energy of the laser pulse can be monitored by a wavelength meter and thermopile energy monitor.

※Optional instruments: 30cm grating spectrograph, 30cm grating double monochromator, gated image intensifier unit, back-illuminated cooled CCD camera, visible streak camera, etc.

■ **Fee**

Analysis by user	3,600 yen/hour
Analysis by staff	10,000 yen/hour

■ **Instrument location** Engineering, Mechanical M2 Building, (Ultra clean room)

High Power Glass Laser System
Continuum custom system(No. 61)

■ **Specifications/Features**

Maximum output: 150 J

Pulse width: Approx. 15 ns

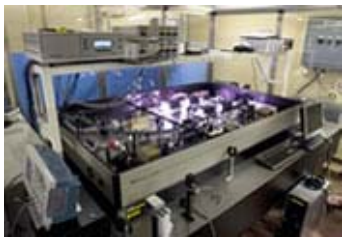
■ **Fee**

Analysis by user	3,000 yen/day
Analysis by staff	6,000 yen/day

■ **Instrument location** Engineering, E6-E113

15. Laser equipment ②

Laser Plasma EUV Light Source Apparatus
Coherent Custom Nd:YAG(No. 25)



■ **Specifications/Features**

This system can output, at a 10-Hz cycle, laser pulses of 200 mJ/40 ps or 800 mJ/300 ps. The basic wavelength is 1064 nm, and wavelengths of 532 nm and 266 nm are available as options.

Equipment is also provided for focusing the laser and illuminating objects. Examples of previous uses include streak camera sweep speed calibration, measurement of impulse response of a semiconductor radiation detector, generation of a plasma X-ray source, and development of an X-ray optical element using that source.

■ **Fee**

Analysis by user	2,000 yen/hour
Analysis by staff	None

■ **Instrument location** Institute of Laser Engineering, Plasma Research Lab, I213

16. Work Apparatus ①

High Resolution 3D Printer
Stratasys Objet Eden 260(No. 88)

■ **Specifications/Features**

[Usable materials] Model materials: FullCure720, MED610, VeroBlue, VeroGray, VeroWhite

[Layer thickness] 16 μm (high-quality mode), 30 μm (high-speed mode)

[Tray size] (X) 260 mm x (Y) 260 mm x (Z) 200 mm

[Build size] (X) 255 mm x (Y) 252 mm x (Z) 200 mm

[Build resolution](X) 600 dpi: 42 μm, (Y) 600 dpi: 42 μm, (Z) 1,600 dpi: 16 μm

■ **Fee**

Analysis by user	1,000 yen/hour (free of charge for users within the course)
Analysis by staff	None

■ **Instrument location** Dentistry, C215

16. Work Apparatus ②

3D Shaping Systems (3D Scanner/3D Printer)
Solutionix Stratasys Rexcan ⅢDimension BST 3D Printer/Catalyst Vere.4.2(No. 65)

■ **Specifications/Features**

(Scanner)

This is a non-contact 3D scanner equipped with twin high-resolution CCD cameras. The system is simple to operate and enables high-speed acquisition of 3D data of the scanned object. A multi-stripe pattern is projected onto the scanned object using the projector at the center of the scanner, and the distortion of the projected pattern is imaged using the two CCD cameras. 3D point cloud data is then acquired based on the principle of triangulation. Automatic measurement can be performed using a turntable. CAD data can be created for items with complex forms, objects of high rarity, and other similar items. Data can be saved in SNX format, and output in STL/IEX/OBJ formats.

Measurement range (X, Y and Z axis): Min. 52.8 × 39.6 × 20 mm to Max. 648 × 486 × 460 mm

Resolution: 1.4 million pixels

(Modeling system)

This enables fabrication of 3D-shaped structures through extrusion and layering of ABS resin based on 3D CAD data (STL files). Maximum shaping size: 203 × 203 × 305 mm

■ **Fee**

Analysis by user	3D printer charge: (A+B+C) × 1.2
	A. Modeling material cartridge rate:
	Modeling material cartridge (920 cm3, 75,000 yen) × cartridge use ratio (%)
	B. Support material cartridge rate:
	Modeling material cartridge (920 cm3, 75,000 yen) × cartridge use ratio (%)
	C. ABS plate (foundation) use rate:
	(Use of only the 3D scanner is free of charge)
Analysis by staff	None
■ **Instrument location**	Engineering, 21st Century Plaza 4F,
	Creative Engineering Center

16. Work Apparatus ③

NC Fine Machine
PMT Micro MC-3(No. 91)

■ **Specifications/Features**

This automatic lathe turning machine enables cutting of 3D forms at micron size using data prepared with the CAD software (GoElan).

Movement range: X-axis 150 mm, Y-axis 150 mm, Z-axis 100 mm

Positioning precision: ±5 μm

Repeatability: ±3 μm

Main shaft rotation speed: 2,000-40,000 rpm

Table dimensions: X direction 250 mm, Y direction 200 mm

Machinable material types: Metal, plastic, ceramics, etc.

Maximum width: Approx. 10 x 10 cm, Thickness: Approx. 4 cm

■ **Fee**

Analysis by user	1,000 yen/hour
Analysis by staff	None

■ **Instrument location** Office for University-Industry Collaboration, A Building, Shared Equipment Room (A-004)

17. Computer ①

CLUSTER COMPUTER SYSTEM
DELL HPC-ProServer(No. 112)

■ **Specifications/Features**

Cluster computing system consisting mainly of Dell PowerEdge R620 and PowerEdge R5500.

Total number of nodes 103

Total number of cores 1120

Peak performances

Clock speed 3.34 THz

Flops

Single precision 24.196 Tera Flops

Double precision 48.391 Tera Flops

Main memories 4.523 TBytes

Disk spaces:

Work space 115 TB

User's home 290 TB

Database 142 TB

Backup 170 TB

Network link speed 10 G SFP+ x 2 (dual)

■ **Fee**

Analysis by user	CPU charge:14 yen/hour
	However, Immunology Frontier Research Center persons :8 yen/hour
	File charge: 20 yen/ month(10GB)
	However, Immunology Frontier Research Center persons :15 yen/month(10GB)
Analysis by staff	None

■ **Instrument location** Immunology Frontier Research Center 403

18. Other ①

Adiabatic Demagnetization Refrigerator System
Cambridge Magnetic Refrigeration MF-ADR50/3T(No. 27)

■ **Specifications/Features**

Enables production of magnetic fields up to 3 T, and cryogenic temperatures up to 50 mK.

With the mFridge, temperature control is performed by directly controlling the magnetic field, without using a heater.

■ **Fee**

Analysis by user	500 yen/hour
Analysis by staff	None

■ **Instrument location** Graduate School of Engineering Science, Center for Science and Technology under Extreme Conditions, 1st Floor (Low Temperature Room,High-Magnetic-Field facility)

Charged Particle Measuring Device
Sumitomo Heavy Industries(No. 24)

■ **Specifications/Features**

This system analyzes the energy of charged particles accelerated by an AVF cyclotron accelerator, and provides transport to various types of experimental instruments at a later stage.

The maximum analyzable proton energy is 80 MeV, and the maximum energy of other ions is 30 MeV per nucleon. Momentum resolution is a maximum of 1/10,000.

This system is used together with the AVF cyclotron accelerator.

■ **Fee**

Analysis by user	None
Analysis by staff	Contact staff for details regarding fees.

■ **Instrument location** Research Center for Nuclear Physics, AVF Cyclotron Beam Transportation Room

The Center for Scientific Instrument Renovation
and Manufacturing Support, Osaka University

Conditions for Joint Use of Reuse Instruments

Issued: April 1, 2014

(Purpose)
Article 1
As defined in Article 12 of the Regulations of the Center for Scientific Instrument Renovation and Manufacturing Support (hereinafter, "the CRM"), these Conditions set forth necessary matters on which students and staff members on campus can make instruments registered in the reuse management system established by the CRM (hereinafter, "reuse instruments").

(Registered Instruments)
Article 2
The instruments available for joint use across the different faculties on campus shall as specified in the appended table.

(User Qualification)
Article 3
Those who can use the reuse instruments (hereinafter, "users") are as follows: (1) all staff of the National University Corporation Osaka University (hereinafter, " the University"), (2) all students of the University.

(Persons in Charge of Reuse Instruments)
Article 4
To each reuse instrument the person in charge of the instrument shall be designated among the staff members of the faculty of the relevant reuse instrument by the head of that faculty.

(Procedure for Use)
Article 5
1 A person who wishes to use a reuse instrument shall obtain prior approval from the CRM director, by submitting an application for approval for joint use of reuse instruments via the online application system.
2 In case of using the reuse instrument, the user must follow all directions from the person in charge of the instrument.
3 When the user has finished/stopped using the reuse instrument, he or she should notify the person in charge of the instrument of the operating conditions used and the working conditions of the instrument during its use.
4 The user shall pay particular attention to prevent accidents and/or damage when using the reuse instrument. Please note that we shall assume no responsibility whatsoever for any damages resulting or arising from, the use of the reuse instrument by the user.

(Reuse Instrument Usage Fees)
Article 6
The CRM will charge usage fees and other necessary expenses to the user. All instruments are available on a fee-per-use basis. The instrument usage fee for each instrument shall be as stipulated in the separate documentation.

(Prohibition of Utilization Other Than for Intended Purposes)
Article 7
The user must not use the reuse instruments for any purposes other than the purposes for which they are intended without approval for use by the CRM. Users must furthermore not allow third parties to make use of the reuse instruments.

(Cancellation of Use Approval)
Article 8
In the event of the user's failure to comply with the provisions or any other situation where the CRM finds that there is a necessity of cancellation in view of the management of the CRM, the director of the CRM may cancel the terms of approval granted for use of the reuse instruments even should this be during the middle of use. Even in this event, users are required to pay usage fees according to the completed amount of use.

(User's Obligations to Compensate Damages)
Article 9

1 In the case of any loss, damage or contamination to facilities and/or instruments due to the user's intention or gross negligence, which is attributable to the user, such user shall restore at the user's cost and expense, said damaged facilities and/or instruments to their original state and/or compensate the relevant faculty for any and all loss, damage and/or contamination.
2 Even due to unavoidable circumstances, the CRM is not responsible for any loss and/or damages incurred to the user.

(Miscellaneous Provisions)
Article 10
In addition to the Conditions, any other matters necessary for joint use of the reuse instrument shall be stipulated separately.

Supplementary Provisions
These Conditions shall come into effect from March 1, 2010.
We hereby revoke our former conditions " Conditions for Joint Use of Reuse issued on March 19, 2008 by the Renovation Center of Instruments for Science Education and Technology, Osaka University.

Revisions coming into effect from April 1, 2010.
Revisions coming into effect from May 1, 2010.
Revisions coming into effect from July 1, 2010.
Revisions coming into effect from August 1, 2010.
Revisions coming into effect from September 1, 2010.
Revisions coming into effect from October 1, 2010.
Revisions coming into effect from January 1, 2011.
Revisions coming into effect from April 1, 2011.
Revisions coming into effect from May 25, 2011.
Revisions coming into effect from September 1, 2011.
Revisions coming into effect from December 1, 2011.
Revisions coming into effect from January 1, 2012.
Revisions coming into effect from February 1, 2012.
Revisions coming into effect from April 1, 2012.
Revisions coming into effect from July 1, 2012.
Revisions coming into effect from October 1, 2012.
Revisions coming into effect from November 1, 2012.
Revisions coming into effect from December 13, 2012.
Revisions coming into effect from March 1, 2013.
Revisions coming into effect from April 1, 2013.
Revisions coming into effect from April 15, 2013.
Revisions coming into effect from July 26, 2013.
Revisions coming into effect from November 1, 2013.
Revisions coming into effect from January 1, 2014.
Revisions coming into effect from January 17, 2014.
Revisions coming into effect from April 1, 2014.
Revisions coming into effect from June 1, 2014.
Revisions coming into effect from July 1, 2014.
Revisions coming into effect from October 1, 2014.
Revisions coming into effect from December 1, 2014.
Revisions coming into effect from January 1, 2015.
Revisions coming into effect from April 1, 2015.
Revisions coming into effect from April 20, 2015.
Revisions coming into effect from May 18, 2015.
Revisions coming into effect from July 1, 2015.
Revisions coming into effect from October 1, 2015.
Revisions coming into effect from December 1, 2015.
Revisions coming into effect from January 1, 2016.
Revisions coming into effect from February 1, 2016.
Revisions coming into effect from March 1, 2016.
Revisions coming into effect from April 1, 2016.
Revisions coming into effect from May 1, 2016.
Revisions coming into effect from June 1, 2016.
Revisions coming into effect from October 1, 2016.
Revisions coming into effect from November 1, 2016.
Revisions coming into effect from December 1, 2016.
Revisions coming into effect from January 1, 2017.
Revisions coming into effect from April 1, 2017.
Revisions coming into effect from May 1, 2017.

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