

Division	Area	Research Group	Keywords	Professor
Materials Physics	Electron Correlation Physics	Theoretical Research Group of Strongly Correlated Systems	Topological insulators and superconductors, Exotic superconductors, Strongly correlated electron systems, Quantum magnetism, Quantum criticality, Mathematical physics	Prof. FUJIMOTO Satoshi
		Experimental Research Group for Spectroscopy of Correlated Materials	Polarization-dependent bulk-sensitive photoelectron spectroscopy (hard X-ray and extremely low-energy excitation), Bulk-sensitive soft x-ray angle-resolved photoemission and its dichroism	Prof. SEKIYAMA Akira
		Experimental Research Group for Electron-correlated Matter Science	NMR/NQR Studies under Multiple Physical Environments, Novel Phases of Condensed Matters, High-Temperature Superconductivity, Quantum Magnetism, Strongly Correlated Electrons Systems	Prof. KITAOKA Yoshio
	Quantum Physics of Nanoscale Materials	Quantum Information and Quantum Optics Group	Quantum information, Quantum cryptography, Quantum computing, Entanglement manipulation, Quantum optics, New aspects of quantum mechanics	Prof. IMOTO Nobuyuki
		Group for Exploration of Functional Materials	Magnetism, Ferroelectricity, Correlated electron systems, Oxides, Crystal growth	Prof. KIMURA Tsuyoshi
	Quantum Materials Physics	Experimental Research Group for Nanoscience	Nanostructures, Spintronics	Prof. SUZUKI Yoshishige
Optical and Quantum Information Science Group		Semiconductor quantum devices, Quantum electronics, Organic and bio-semiconductor nano-physics	Prof. MATSUMOTO Kazuhiko	
	Condensed Matter Theory	First-principles calculation, Condensed matter theory, Materials prediction and design, Magnetism, Ferroelectricity, Superconductivity, Multiferroics	Prof. OGUCHI Tamio	
Chemistry	Synthetic Chemistry	Synthetic Organic Chemistry Group	Environmentally benign process for molecular transformations, Simulation of enzymatic functions with metallo- and organocatalysts, Creation of functional organometallics	Prof. NAOTA Takeshi
		Synthetic Polymer Chemistry Group	Stereospecific Living Polymerization, Stereoregular Polymers, Precision Polymer Synthesis, Uniform Polymers, Functional Polymers, Polymer Characterization	Prof. KITAYAMA Tatsuki
		Organometallic Chemistry Group	Design and Synthesis of Homogeneous Molecular Catalysts, Organometallic Complexes, Metal Nanoclusters, Chiral Complexes, and Molecular Devices	Prof. MASHIMA Kazushi
	Molecular Organization Chemistry	Surface Chemistry Group	Energy Conversion, Electrode Interfaces, Ionic Liquid Interfacial Chemistry, Catalytic Reaction Mechanism, Electron Transfer at Interfaces	Prof. FUKUI Ken-ichi
		Biological Chemistry Group	Nucleic acids chemistry, Chemical synthesis of oligonucleotides, DNA damage, DNA repair, Biomolecular recognition, Protein–nucleic acid interactions	Prof. IWAI Shigenori
	Solar Energy Chemistry	Solar Energy Conversion	Light-to-chemical energy conversion, Photofunctional materials, Photoelectrocatalysts, Electrocatalytic reactions, Photosynthesis	Prof. NAKANISHI Shuji
Chemical Engineering	Chemical Reaction Engineering	Nanoreaction Engineering Group	Chemical reaction engineering, porous materials, inorganic membranes, liquid crystals	Prof. NISHIYAMA Norikazu
		Quantum Chemical Engineering group	Quantum nonlinear optics, Materials-oriented quantum chemistry, Open-shell molecular systems, Quantum dynamics	Prof. NAKANO Masayoshi
		High-Performance Catalyst Group	Green Chemistry, Environmentally-benign organic synthesis, Inorganic crystallites, Dendrimer, Nanocluster	Prof. JITSUKAWA Koichiro
	Environment and Energy System	Transport Phenomena Control Group	Control of Heat and Mass Transfer, Liquid-Liquid Interface, Phase Change, Computational Fluid Dynamics	Prof. OKANO Yasunori
		Molecular-Aggregate Chemical Engineering Group	Soft Self-Organizing System, Distribution of Molecule at Mesoscale, Amphiphilic Molecule, Ionic Liquid, Molecular Simulation, Solution Theory	Prof. MATUBAYASI Nobuyuki
	Bioprocess Engineering	Bio-Inspired Chemical Engineering Group	Bio-Inspired Chemical Engineering, Self-Assemblies, Engineering Science of Liposome, Molecular Recognition, Artificial Enzyme, Bioseparation	Prof. UMAKOSHI Hiroshi
		Bioreaction Engineering Group	Bioprocess, Bioreactor, Gene/metabolic Engineering, Tissue Engineering, Environment Bioengineering	Prof. TAYA Masahito
		Biochemical Materials Engineering Group	Biomedical, Biomaterial, Tissue fabrication, Hydrogel, Soft matter, Biochemical engineering	Prof. SAKAI Shinji
Solar Energy Chemistry	Environmental Photochemical Engineering Group	Photocatalysts, Highly Selective Transformation of Organic Compounds, Artificial Photosynthesis, Photoluminescent Molecular Devices and Sensors	Prof. HIRAI Takayuki	
Frontier Materials Science	Frontier Materials	Molecular Architectonics Research Group	Experimental and Theoretical Studies on Molecular-based and Molecular-scale Electronics, Spintronics and Thermoelectronics, and on Novel Molecular Architectures utilizing Fluctuations towards Brain-like Devices	Prof. TADA Hirokazu
		Experimental Research Group for Functional Molecules	Development of Functional Organic Materials for Optoelectronic Applications, Supramolecular Chemistry based on Two-Dimensional Self-Assembly on Surfaces, Creation of Functional Materials based on Multiple Molecular Interactions	Prof. TOBE Yoshito
		Theory Group of Advanced Materials Science	Computational materials design, Numerical simulation of many-body systems (Elucidation and prediction of new phase of matters under extreme conditions, The first-principles calculations and its development based on the quantum simulation)	Prof. KATAYAMA-YOSHIDA Hiroshi (Assoc. Prof. KUSAKABE Ko-ichi)
	Dynamics of Nanoscale Materials	Experimental Research Group for Coherence of Nanoscale Materials	Optical properties of semiconductor ultrathin films and nanoparticles, and strongly-correlated electron systems, Nonlinear laser spectroscopy, Ultrafast time-resolved spectroscopy, THz spectroscopy, SEM-cathodoluminescence. Optical fabrication and manipulation of nanoparticles	Prof. ASHIDA Masaaki
		Experimental Research Group for Fluctuation Dynamics in Condensed Phase	photochemistry, photofunctional molecule, three-dimensional three-pulse photon echo, ultrafast detection of photochemical reactions, laser-control of chemical reactions, time-resolved microscopy, single-molecule measurement, biomolecular fluctuation	Prof. MIYASAKA Hiroshi
	Quantum Science in Extreme Conditions	Experimental Research Group for Materials Science in Extreme Conditions	Material science at extreme conditions; Superconductivity, magnetism, structural phase transitions, new material and new function	Prof. SHIMIZU Katsuya
		Experimental Research Group for Materials Engineering Science in Nano-structure	Nano-fabrication of solids and semiconductors, Hetero-structure of oxides, Nano-materials device, Electronics of functional oxides	Prof. TANAKA Hidekazu

Division	Area	Research Group	Keywords	Professor
Nonlinear Mechanics	Mechanics of Fluids and Thermo-fluids	Thermal Engineering and Science Group	Turbulent Flows, Turbulence Control, Subcritical Transition to Turbulence, Heat Transfer Enhancement, Drag Reduction, Unsteady and Chaotic Thermal Convection Fields	Prof. KAWAHARA Genta
		Fluid Mechanics Group	Nonlinear phenomena in fluid mechanics, Transport and mixing, Complex fluids, Turbulent flows, Interfacial flows, Nonlinear waves and vibrations	Prof. GOTO Susumu
	Mechanics of Solid Materials	Strength of Structure and Materials Group	Dynamic behavior of materials and structure, Biomimetics of plants, Hydrogen embrittlement of metals, Mechanical properties of functional materials, Development of new structural materials	Prof. KOBAYASHI Hidetoshi
		Solid Mechanics Group	Noncontact ultrasonic measurements, Characterization of emerging functional materials, Electromagnetic acoustic sensing, Biosensors, Resonance Ultrasound Microscopy, Micromechanics	Prof. HIRAO Masahiko
Mechanical Engineering	Propulsion Engineering	Molecular Fluid Dynamics Group	Molecular fluid dynamics for life science, environmental technology, and space engineering. Nanoscale medical device, Numerical design of next-generation battery, Atmospheric flow on planets, Micro/nanoscale multiphase flow, Coexistence of flow field and fluctuation, Ionic current, Non-equilibrium gas flow	Prof. KAWANO Satoyuki
		Fluids Engineering Group	Multiphase Flows, Cavitating Flows, Flow Control, Numerical Scheme and Algorithm, High Performance Computing, Optical Measurements	Prof. SUGIYAMA Kazuyasu
	Mechano-informatics	Robotics and Mechatronics Group	Human-Robot Interface, Analysis of Human Movements, Human-like Musculoskeletal Robots, Human Skills Transfer to Robots, Robotic Orthosis, Assistance System for Single-Incision Laparoscopic Surgery	Prof. MIYAZAKI Fumio
		Theoretical Solid Mechanics Group	Predictive multiscale-multiphysics modeling and simulation of solids	Prof. OGATA Shigenobu
Bioengineering	Biomechanical Science	Biomechanics Group	Biomechanics of cells, tissues, and organs, Functional adaptation and remodeling, Computational biomechanics, Biofluid dynamics, Biomechanical Imaging	Prof. WADA Shigeo
		Mechanical and Bioengineering Systems Group	Biomechanical System Modeling, Biomechanical Simulation, Orthopaedic/Dental Biomechanics, Musculo-Skeletal Dynamics, Rehabilitation Engineering, Welfare Engineering, Assistive Technology, Adaptive Structures and Systems, Optimum/Adaptive Structural Design, Smart System Design	Prof. TANAKA Masao
		Biomechanical/physical informatics Group	Health Engineering, Human Stress Sensing/Control, Bio-signal, Biomarker, Early Detection of Disease, Lipid Peroxidation	Guest Prof. YOSHIDA Yasukazu
	Biophysical Engineering	BioSystem Engineering Group	Artificial Intelligence, Deep Learning, Biophysics, Cell Engineering, Tissue Engineering, Stem Cell Biotechnology, Brain-Machine Interface, Robotics, Nanobiotechnology, Renewable Energy	Prof. MIYAKE Jun
		Bio-Dynamics Group	Nonlinear dynamical system theory and its application to biology, Human motor control, Posture and Gait, Biological rhythms, Cardiac arrhythmias, Systems physiology, Biosignal processing, Homeodynamics, Bio-big data analysis	Prof. NOMURA Taishin
	Biomedical and Biophysical Measurements	Molecular BioMeasurement Group	Physical/biochemical properties of cells and subcellular components, Bioengineering-based drug repositioning, Cellular adaptation to mechanical environment, Biomedical optics, Laser associated non-linear photonics, Tissue engineering	Prof. DEGUCHI Shinji
Bioimaging Group		Biomedical measurement, Medical image, CG, Visualization, Display system, VR, Haptic rendering, Human-computer interaction, Communication, Information sharing, Physics-based simulation, Complex Space	Prof. OSHIRO Osamu	

Division	Area	Research Group	Keywords	Professor
Advanced Electronics and Optical Science	Solid State Electronics	Nanoelectronics Group	Group-IV semiconductor materials, Nitride semiconductor materials, Nanodots, Functional memory devices, Thermoelectric devices, Synchrotron radiation X-ray microdiffraction, Transmission electron microscopy	Prof. SAKAI Akira Prof. NAKAMURA Yoshiaki
		Optoelectronics Group	Thin-film solar cells, Thin-film displays, Amorphous semiconductors, nano-crystalline semiconductors, Modulation spectroscopy	Prof. OKAMOTO Hiroaki
		Nano-scale Physics & Device Group	Semiconductor spintronics, Low-temperature MBE, Metal/Semiconductor interface, Semiconductor/Oxide interface, Flexible electronics	Prof. HAMAYA Kohei
	Advanced Quantum Devices and Electronics	Advanced Quantum Device System Group	Nuclear quadrupole resonance (NQR), Mine detection, Baggage inspection, Nondestructive Evaluation, Superconducting interference device (SQUID), High temperature superconducting electronics	
		Advanced Quantum Information Device Group	Quantum computers, Quantum information, Nuclear magnetic resonance (NMR), Electron spin resonance (ESR)	Prof. KITAGAWA Masahiro
	Optical Electronics	Microwave Photonics Group	Artificial metamaterials, Transformation optics, Invisibility cloaks, Photonics crystals, Microwave photonics, Integrated optical circuits, Optical modulators, Optical measurements, Optical scattering	Prof. SANADA Atsushi
		Information Photonics Group	Millimeter- and terahertz-wave photonics, Nano-structure photonics, Metamaterials, Ultrafast electronics, Photonic signal processing and measurement, Communication systems	Prof. NAGATSUMA Tadao
		Quantum Electronics Group	Laser cooling, Quantum information, Quantum optics, Ion trap, Laser stabilization, Frequency standard	
	Advanced Electronics Under Extreme Conditions	Advanced Electronics Group	Atom technology, Nanobiology, Nanoelectronics, Scanning Probe Microscopy, Medical Engineering, Nanometer analysis and characterization	Prof. ABE Masayuki
	Systems Science and Applied Informatics	System Theory	Adaptive Robotics Group	Soft Robotics, Embodied Artificial Intelligence, Bio-mimetic Robotics, Bio-Robotics, Muscular-skeletal Robots, Humanoid Robots
Systems Analysis Group			Signal Analysis, Systems Analysis, Adaptive System, Noise suppressor, Image interpolation, Feature extraction	Prof. IIGUNI Youji
Intelligent Systems		Applied Robotics Group	Robot Mechanism, Robot Vision, Ambient Intelligence, Nano-Micro Robotics, Humanoids & Multi-Legged Robots, Safety & Security Robotics, Human Robot Interaction	Prof. ARAI Tatsuo
		Intelligent Robotics Group	Interactive Intelligent Robots, Android Science, Learning and Developing Robot, Bio-mimetic system, Communication robots, Brain-Machine Interface	Prof. ISHIGURO Hiroshi
		Pattern Measurement Group	Vision Sensing, Image Engineering, 3D Measurement, Intelligent Sensing, Digital Archives, Augmented Reality, Mixed Reality, Human Interface	Prof. SATO Kosuke
		Robotic Manipulation Research Group	Robot Manipulator, Motion Planning, Assembly, Human-Computer Interaction, Social Computing, Augmented Reality	Prof. HARADA Kensuke
Mathematical Science	Mathematical Modelling	Differential Equation Group	Nonlinear partial differential equations, Variational methods, Singularity formation, Mathematical fluid dynamics, Mathematical sciences	Prof. KOBAYASHI Takayuki
		Applied Analysis Group	Nonlinear analysis, Mathematical modeling, Numerical simulation, Mathematical biology, Mathematical oncology, Nonlinear PDE of elliptic and parabolic type, Mathematical physics, Source identification	Prof. SUZUKI Takashi
	Statistical Science	Statistical Analysis Group	Model Selection, High-Dimensional Statistics, Machine Learning, Bioinformatics, Complex Networks, Statistical Graphics, Statistical Computing, Resampling, Nonparametric Statistics, Information Geometry, Quantum Tomography	Prof. SHIMODAIRA Hidetoshi
		Statistical Science Group	Multivariate analysis, Structural equation modeling, Statistical causal inference, information loss, time series analysis, model selection	Prof. KANO Yutaka
Mathematical Science for Social Systems	Mathematical and Statistical Finance	Research Group of Statistical Inference	Financial data analysis, High frequency data analysis, Actuarial mathematics, Statistics for stochastic differential equations, Monte Carlo methods, Mathematical statistics, machine Learning, fMRI data analysis	Prof. UCHIDA Masayuki
		Research Group of Mathematical Modeling in Finance	Long-term optimal investment, Dynamic portfolio selection, Asset price modeling, Stochastic control, Differential games, Dynamic programming equations, Optimal execution, Liquidity problem, Quantitative risk management	Prof. SEKINE Jun
		Research Group of Stochastic Analysis	Stochastic integration, Stochastic differential equations, Fractional Brownian motion, Rough path analysis, Mathematical finance, Quantitative Finance, Computational finance, Financial engineering	Prof. FUKASAWA Masaaki
	Theoretical Systems Science	Research Group of Complex Systems	Systems theory, Discrete event systems, Hybrid systems, Embedded systems, Nonlinear systems, Evolutionary game, Cyber-physical systems	Prof. USHIO Toshimitsu
		Research Group of Systems Optimization and Decision Making	Decision making, Systems optimization, Combinatorial optimization, Multiple criteria decision aiding, Fuzzy-logic, Data mining, Supply chain management, Computational Intelligence	Prof. INUIGUCHI Masahiro