



# **Professor Profiles 2017**

School of Materials and Chemical Technology

Tokyo Institute of Technology

## Encompassing the Disciplines of Science

Tokyo Tech boasts top-level research teams in the fields of chemical and materials science and engineering, with some excellent achievements to their name. In the School of Materials and Chemical Technology, students learn how to improve our lives and solve environmental, resource, and energy issues by creating new substances and materials of direct use to society, and creating new methods for their production. The School consists of two departments — Chemical Science and Engineering, with its roots in molecular chemistry, and Materials Science and Engineering, with its roots in solid materials. Students will learn a broad range of basic theories related to matter and materials, and how these theories can be applied to better support our lives. We also have affiliated research centers designated as national research hubs for research in chemistry and materials, where students come into contact with and engage in cutting-edge research as they advance through their studies.





## Message from the Dean

Our School is dedicated to creating new functions based on a solid understanding of the structure and properties of matter. It also aims to nurture researchers and engineers capable of discovering principles and methods for controlling the dynamic chemical processes of substances. This is a place for top-level researchers to interact and cooperate, and for educating young people willing to solve issues related to the environment, energy, resources, safety, and health through work with various materials. Get involved with learning and research that creates a civilization in which all living things can prosper.

Yuji Wada

# Department of Materials Science and Engineering

## Vision

Create new materials and engineering technologies that contribute to industrial development and cultivate individuals who make a difference to society

Materials. They play an important role in forming, molding, and advancing societies. They are responsible for the considerable transformations in our daily lives. After all, they are what give shape to science and technology. At the Department of Materials Science and Engineering, we work to continuously progress the field of materials science. Our students are trained to use the advanced and specialized knowledge of materials they acquire to carry out original and challenging research and development. They learn to find creative solutions to materials-related problems on their own, and furthermore, to conceive of ways to implement these solutions in the real world. The curriculum is designed to allow students to acquire a broad range of fundamental knowledge in materials science, from metallic materials and organic materials to inorganic materials. Through our courses, students also gain the knowledge and develop the creativity necessary to bring new, innovative industrial materials into existence. Our students will become the leading scientists and engineers in the field of materials science that are sought by the industrial world.


## Message from the Department Chair


Materials science is the oldest and strongest field of study at Tokyo Institute of Technology. To uphold this long-standing reputation, we strive to teach and research cutting-edge materials science. To help us with this, we have done some restructuring. Before the education reform, the Departments of Metallurgical Engineering, Organic and Polymeric Materials, and Inorganic Materials formed what was called the 2nd Academic Group (for undergraduate students). Along with this, many departments in different graduate schools dealt with materials. Namely, these were the Department of Metallurgy and Ceramics Science, Part of the Department of Organic and Polymeric Materials, Department of Innovative and Engineered Materials, and Department of Materials Science and Engineering. We brought all of these establishments together under a single roof to comprehensively study materials science. Welcome to the new Department of Materials Science and Engineering. (Takehiko Mori)





# Metallurgy and Surface Science


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	<b>Toshiyuki Fujii</b>
	Professor
	fujii.t.af ● m.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Microstructure in metals / Mechanical properties of materials / High strength and high conductivity copper alloys / Fatigue of metals
Current Research Projects	Evolution of dislocation structures during cyclic deformation of metals and alloys


	<b>Miyuki Hayashi</b>
	Associate Professor
	hayashi ● mtl.titech.ac.jp
	Major Energy Science and Engineering / Materials Science and Engineering
Research Field	Physicochemical properties of Melts in Metallurgy / Ironmaking process / Environmentally Friendly High Temperature Process
Current Research Projects	Thermochemical properties and structures of molten silicates containing iron ions / Utilization of low grade iron ore / Development of new iron ore sinters aiming for CO2 emission reduction

	<b>Tomonari Inamura</b>
	Associate Professor
	inamura.t.aa ● m.titech.ac.jp
	Major Materials Science and Engineering / Energy Science and Engineering
Research Field	Phase transformation in metals / Crystallography / Metallography / Shape memory alloy
Current Research Projects	Super long life shape memory alloy, Biomedical titanium alloy


	<b>Kenichi Kawamura</b>
	Associate Professor
	kawamura ● mtl.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Solid chemistry / High temperature oxidation of metals / Electrochemistry in solid
Current Research Projects	Referenceless zirconia oxygen sensor / Electrochemical protection for high-temperature oxidation of metal

	<b>Equo Kobayashi</b>
	Associate Professor
	equo ● mtl.titech.ac.jp
	Major Materials Science and Engineering / Human Centered Science and Biomedical Engineering
Research Field	Non-ferrous metals / Biomedical materials / Functional materials / Standardization of medical devices
Current Research Projects	Alloy designing of biomedical beta type Ti alloys / Biodegradable Mg-matrix composite / Microstructural control of novel Al alloys / High performance Cu alloys

	<b>Yoshihiro Gohda</b>
	Associate Professor
	gohda.y.ab ● m.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Condensed matter theory / Computational materials science / Magnetic metals / Nano-interfaces
Current Research Projects	Theory of permanent magnets / Theory of surface nanostructures

	<b>Hideki Hosoda</b>
	Professor
	hosoda.h.aa ● m.titech.ac.jp
	Major Materials Science and Engineering / Energy Science and Engineering
Research Field	Functional materials / Alloy design / Phase stability / Shape change materials / Intermetallics / Composites / Biomaterials / Microstructural control
Current Research Projects	Dynamics of domain homo interface in shape change materials / Development of advanced medical devices based on shape memory alloys / Development of Ti-based or precious-metal-based functional biomaterials / Development of ferromagnetic-shape-memory-alloy-based smart-composites

	<b>Masanori Kajihara</b>
	Professor
	kajihara ● materia.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Development of conductor metals / Development of Pb-free solders / Development of superconducting materials / Microstructure evolution and kinetics of alloys
Current Research Projects	Development of conductor metals / Development of Pb-free solders / Development of superconducting materials


	<b>Yoshisato Kimura</b>
	Associate Professor
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	Major Energy Science and Engineering / Materials Science and Engineering
Research Field	Intermetallic compounds / Thermoelectric materials / Phase diagrams / Microstructure and lattice defects control
Current Research Projects	Heat resistant alloys design based on intermetallic phases / Thermoelectric materials design based on phase equilibria / Reliability evaluation of thermoelectric materials / Deformation behavior of intermetallic alloys


	<b>Satoru Kobayashi</b>
	Associate Professor
	kobayashi.s.be ● m.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Heat resistant alloys/steels / Microstructure control / Intermetallic alloys / Ferrous materials
Current Research Projects	Novel Ni base superalloy design / Creep deformation mechanisms in Ni based wrought superalloys / Microstructural control in heat resistant ferritic steels with Laves phase precipitation

# Metallurgy and Surface Science


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	<b>Yoshinao Kobayashi</b>
	Professor
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	<div>Major</div> <b>Nuclear Engineering / Materials Science and Engineering</b>
<div>Research Field</div>	Safety metallurgy for nuclear reactor / Metal smelting and refining / Metal recycle / Iron and steel making
<div>Current Research Projects</div>	Accessibility for removal of fuel debris in BWR plant after severe accident / Elements Strategy Initiative Project for Magnetic Materials / Thermodynamics and kinetics of steelmaking slags toward effective and high speed refining


	<b>Shinji Kumai</b>
	Professor
	kumai.s.aa ● m.titech.ac.jp
	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Light metals and alloys / Advanced casting process / Dissimilar metal joining / Fatigue and fracture
<div>Current Research Projects</div>	Similar- and dissimilar-metal joining by using advanced impact welding methods / Formation mechanism of wavy interface in impact welded metals / Fabrication of advanced aluminum alloy sheets by using vertical-type high-speed twin-roll casting / Color metallography of aluminum alloys by using special etchant

	<b>Shinji Muraishi</b>
	Associate Professor
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Light metals and alloys / Electron microscopy / Dislocation dynamics / Thin metal films / Magnetic nano particles
<div>Current Research Projects</div>	Microstructural controlling of aluminum alloys / In-situ TEM observation of dislocation motion in alloys / Micromechanics based dislocation dynamics simulation / Characterization and magnetic anisotropy of nano-magnets


	<b>Nobuo Nakada</b>
	Associate Professor
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Metals and alloys / Iron and steel / Metallurgy / Mechanical property
<div>Current Research Projects</div>	Microstructural control for steels with excellent mechanical properties / Relationship between microstructure and mechanical property in structural metals and alloys / Thermomechanical processing and phase transformations


	<b>Yoshio Nakamura</b>
	Professor
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Diffraction crystallography / Electron microscopy / Physical properties of thin film / Nanohetero structure
<div>Current Research Projects</div>	stress measurement of thin film / electronic state of magnetic alloy / in-situ X-ray diffraction

	<b>Kan Nakatsuji</b>
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Surface and interface physics / Physics at metal surfaces / Nano-structures / Photoelectron spectroscopy
<div>Current Research Projects</div>	Electronic structure of Bi-related ultra-thin films / Hydrogen adsorption on metal surfaces

	<b>Atsushi Nishikata</b>
	Professor
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Electrochemistry / Corrosion science / Fuel cell / Metallurgy
<div>Current Research Projects</div>	Degradation mechanism of Pt and Pt alloy catalysts for PEMFC / Corrosion protection of metallic materials in high temperature heat medium / Electrochemical impedance spectroscopy for atmospheric corrosion study / Steel corrosion in soil and concrete

	<b>Susumu Onaka</b>
	Professor
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Metals and alloys / Deformation and fracture / Strength / Materials science
<div>Current Research Projects</div>	Control of microstructures by severe plastic deformation / Micromechanical analysis on deformation behavior of materials / Modeling of microstructural changes in metals and alloys


	<b>Takumi Sannomiya</b>
	Associate Professor
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	<div>Major</div> <b>Materials Science and Engineering</b>
<div>Research Field</div>	Transmission electron microscopy / Nanooptical materials / Plasmonics / Biosensors
<div>Current Research Projects</div>	Cathodoluminescence on Plasmonic Nanostructures


	<b>Ji Shi</b>
	Professor
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	<div>Major</div> <b>Energy Science and Engineering / Materials Science and Engineering</b>
<div>Research Field</div>	Metal physics / Thin film technology / Magnetic thin films / Nanohetero structures
<div>Current Research Projects</div>	Design of functional nanohetero structures/Interface interactions in nanohetero structures/Perpendicular exchange bias/Magnetic semiconductors




# Metallurgy and Surface Science


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	<b>Masato Sone</b>
	Professor
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	<div>Major</div> Human Centered Science and Biomedical Engineering / Materials Science and Engineering / Energy Science and Engineering
<div>Research Field</div>	Biomedical materials / Bio-MEMS / Biosensor / Electrodeposition / Wearable sensor / Hybrid materials
<div>Current Research Projects</div>	Material design & the mechanical property evaluation of electrodeposited gold for high sensitive inertia detection device / Material design & evaluation of metal/polymer hybrid structure for wearable sensor

	<b>Eiji Tada</b>
	Associate Professor
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	<div>Major</div> Materials Science and Engineering
<div>Research Field</div>	Electrochemistry / Corrosion science / Surface treatment / Metallurgy
<div>Current Research Projects</div>	Environmentally induced cracking of metallic materials / Galvanic corrosion of metallic joints / Numerical simulation of aqueous corrosion of metals and alloys

	<b>Yoshihiro Terada</b>
	Associate Professor
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	<div>Major</div> Materials Science and Engineering
<div>Research Field</div>	Heat-resistant metallic materials / High-temperature strength / Alloy development / Microstructure
<div>Current Research Projects</div>	Development of Mg-rich nanolamellar alloys / Microstructure control of Ni-based superalloys / Evaluation of precipitate morphology in superalloys / Dislocation movements in heat-resistant Mg alloys


	<b>Masahiro Susa</b>
	Professor
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	<div>Major</div> Energy Science and Engineering / Materials Science and Engineering
<div>Research Field</div>	Physical chemistry of materials / Steelmaking process / Thermophysical properties measurements
<div>Current Research Projects</div>	Thermal conductivity/diffusivity of iron oxide scale on steel / Heat flux measurement for water cooling of steel / Mould flux designing for high speed continuous casting of steel


	<b>Masao Takeyama</b>
	Professor
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	<div>Major</div> Materials Science and Engineering / Energy Science and Engineering
<div>Research Field</div>	Physical Metallurgy of Alloys and Intermetallics / High-temperature Alloy Design / Phase Equilibria and phase transformations
<div>Current Research Projects</div>	Design principle of Titanium aluminides, super heat-resistant steels, superalloys / Structure of Intermetallics / Creep Deformation of high-temperature metallic and intermetallic alloys


	<b>Mitsutoshi Ueda</b>
	Associate Professor
	mueda ● mtl.titech.ac.jp
	<div>Major</div> Energy Science and Engineering / Materials Science and Engineering
<div>Research Field</div>	High temperature oxidation of metallic materials / Physical chemistry at high temperature
<div>Current Research Projects</div>	High temperature steam oxidation of austenitic steels


# Organic and Polymeric Materials


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	<b>Shigeo Asai</b>
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Structure and properties of polymers / Electrical conductive polymer composites / Ion-conducting polymer blends / Microcellular plastics
<b>Current Research Projects</b>	Polymers treated with high-pressure CO <sub>2</sub> / Biodegradable polymers and polymer blends / Electrical conductive polymer composites / Ion-conducting polymer blends


	<b>Teruaki Hayakawa</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Polymer Synthesis / Polymer Thin Films / Self-Organizing Polymeric Materials / Directed Self-Assembly
<b>Current Research Projects</b>	Precise Synthesis of Block Copolymers / Directed Self-Assembly / Nano-Defect Management For Block Copolymer Lithography / Nanoporous Polymeric Materials


	<b>Yuhei Hayamizu</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering / Human Centered Science and Biomedical Engineering
<b>Research Field</b>	Bio-Nano Interface/Peptide Self-Assembly/2D nanomaterials/Biosensors
<b>Current Research Projects</b>	Bio-Nano Interface/Peptide Self-Assembly/2D nanomaterials/Biosensors


	<b>Ken Ishikawa</b>
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	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Optoelectronic organic materials / Biomimetic organic materials
<b>Current Research Projects</b>	Organic solar cells / Organic transistors / Liquid crystals / Structural color materials


	<b>Takeshi Kikutani</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Fibers, films and polymeric materials / Processing of organic materials / Structure and properties / Fiber-reinforced composites
<b>Current Research Projects</b>	High-speed fiber spinning / Bicomponent fiber spinning / uni- and bi-axial film stretching / thermoplastic fiber reinforced composites

	<b>Hidetoshi Matsumoto</b>
	Associate Professor
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	<b>Major</b> Energy Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	Physical chemistry of organic materials / Nanofibers and nanomaterials / Polymer membranes and thin films / Energy conversion and storage
<b>Current Research Projects</b>	Nanocomposite membranes / Nanocomposite electrolytes / Functional thin films / Functional nanofibers

	<b>Tsuyoshi Michinobu</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Organic material / Polymer synthesis / Semiconducting polymer / Organic electronics
<b>Current Research Projects</b>	High mobility organic semiconducting polymers / Fluorescent semiconducting polymer dots / Crack detection paints

	<b>Takehiko Mori</b>
	Professor
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	<b>Major</b> Energy Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	Organic electronics / Organic transistors / Organic conductors / Solid-state physical chemistry
<b>Current Research Projects</b>	New organic transistor materials / Single-crystal organic transistors


	<b>Junko Morikawa</b>
	Professor
	morikawa.j.aa ● m.titech.ac.jp
	<b>Major</b> Human Centered Science and Biomedical Engineering / Materials Science and Engineering
<b>Research Field</b>	Polymer physics / Thermophysical properties measurements / Thermal management / Thermal properties of materials / Polymer processing
<b>Current Research Projects</b>	Multi-spectrum thermal imaging of polymer composite / Heat storage materials / Materials informatics


	<b>Yukio Ouchi</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Physical chemistry and electrochemistry of Ionic liquids / Nonlinear optical spectroscopy / Photoelectron emission spectroscopy
<b>Current Research Projects</b>	Studies on ionic liquid buried interfaces (Liquid/Liquid, Solid/Liquid) for novel functionalities / Electronic structure of ionic liquids / Polymer-ionic liquid composites





# Organic and Polymeric Materials

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	<b>Toshiaki Ougizawa</b>
	Professor
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	Major Materials Science and Engineering
Research Field	Physical properties of organic materials / Polymer alloys / Composites / Interfacial adhesion
Current Research Projects	Control of structure and properties in multicomponent polymer systems / Interfacial structure and adhesion in polymeric systems


	<b>Yasuyuki Tezuka</b>
	Professor
	ytezuka ● o.cc.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Topological Polymer Chemistry
Current Research Projects	Construction of novel polymer topologies / Polymer materials design by topology effects


	<b>Masatoshi Shioya</b>
	Associate Professor
	shioya.m.aa ● m.titech.ac.jp
	Major Materials Science and Engineering
Research Field	Physical properties / Structure analysis / Fibers / Composites
Current Research Projects	Structure changes of polymeric materials under stress as measured by synchrotron radiation X-ray scattering / Intrinsic strength of carbon fibers / Effects of carbon nanofiller-dispersions on physical properties of elastomers and adhesives


	<b>Martin Vacha</b>
	Professor
	vacha.m.aa ● m.titech.ac.jp
	Major Materials Science and Engineering / Energy Science and Engineering
Research Field	Nanoscale properties of organic materials / Photophysics of organic molecules / Single-molecule spectroscopy
Current Research Projects	Conformation and photophysics of conjugated polymers for electroluminescence / Plasmon enhancement of molecular photophysics in single hybrid nanoparticles / Photophysics of novel semiconductor and perovskite nanocrystals / Nanoscale properties of organic photon-upconversion systems


# Inorganic Materials


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	<b>Masaki Azuma</b>
	Professor
	mazuma ● msl.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Solid state chemistry / Transition metal oxides / Precise structural analysis / Functional materials
<b>Current Research Projects</b>	Negative thermal expansion / Multiferroics / Lead-free piezoceramics


	<b>Yasuo Azuma</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Nanodevice / Molecular electronics / Nanoparticle
<b>Current Research Projects</b>	Nanofabrication by electron-beam lithography / Bottom-up single-electron transistors / Electrical characteristics of nanomaterials


	<b>Hiroshi Funakubo</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Functional inorganic films / Ferroelectric materials / CVD / Inorganic device
<b>Current Research Projects</b>	Ferroelectric devices/Inorganic capacitor/film devices/ Thermoelectric devices/Thin Film SOFC


	<b>Michikazu Hara</b>
	Professor
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	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Catalyst / Chemical reaction / Inorganic / Heterogeneous catalysis
<b>Current Research Projects</b>	JST, ALCA / JST, ACCEL / JST, ASTEP STAGEIII / NextEP-B


	<b>Tomohiro Hayashi</b>
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	<b>Major</b> Human Centered Science and Biomedical Engineering / Materials Science and Engineering
<b>Research Field</b>	Biointerfaces / Surface & interface science / Scanning probe microscopy / Nanophotonics
<b>Current Research Projects</b>	Development of atomic force microscopes / Biomaterials informatics / Single-molecule force and vibrational spectroscopy

	<b>Hidenori Hiramatsu</b>
	Associate Professor
	h-hirama ● mces.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Thin film growth / Optoelectronic properties / Superconductivity / Optoelectronic devices
<b>Current Research Projects</b>	Nitride-, chalcogenide-, and oxide-semiconductors / Pnictide superconductors

	<b>Hideo Hosono</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Inorganic functional materials / Superconductors / Transparent semiconductors
<b>Current Research Projects</b>	Iron-based superconductors/Transparent semiconductors for OLEDs/ Materials Science and application of Electrodes

	<b>Toshiyuki Ikoma</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering / Human Centered Science and Biomedical Engineering
<b>Research Field</b>	Nanomedicine / Biosensing / Regenerative medicine / Inorganic material
<b>Current Research Projects</b>	Multifunctional nanomaterials for theranostics /Calcium phosphate and collagen composites for tissue engineering /hydroxyapatite and silver composites for antimicrobial biomedical devices/ Biointerface of materials and cells


	<b>Mitsuru Itoh</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Dielectric materials / Ferroelectric materials / Multiferroics / Ionic conductors / Nano materials design
<b>Current Research Projects</b>	Novel multiferroic materials / Metastable materials engineering / High performance Li battery / Mechanism of ferroelectricity in materials


	<b>Keigo Kamata</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Catalyst / Chemical reaction / Inorganic / Heterogeneous catalysis
<b>Current Research Projects</b>	Catalyst / Chemical reaction / Inorganic / Heterogeneous catalysis





# Inorganic Materials


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	<b>Toshio Kamiya</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Materials science / Semiconductor devices / Simulation / Electronic structure and carrier transport
<b>Current Research Projects</b>	Design and development of new oxide semiconductors / Materials design using first-principles calculations / Development of thin-film transistors and light-emitting devices


	<b>Takayoshi Katase</b>
	Associate Professor
	katase ● mces.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Oxide electronics / Energy harvesting / Optoelectronic device / Superconductivity / Electrochemistry
<b>Current Research Projects</b>	High performance thermoelectric materials using thin film interface / Multifunctional memory device / High-temperature superconducting materials


	<b>Hitoshi Kawaji</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Inorganic / Solid state physics / Functional materials / Thermal properties
<b>Current Research Projects</b>	Phase transition mechanism of multiferroic materials / Heat capacity, thermal expansion and thermal conductivity of ceramics / Phase transition of materials trapped in nanospaces


	<b>Yoshitaka Kitamoto</b>
	Professor
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	<b>Major</b> Human Centered Science and Biomedical Engineering / Materials Science and Engineering
<b>Research Field</b>	Magnetic materials and devices / Biomaterials and biodevices / Nanomaterials and nanodevices
<b>Current Research Projects</b>	Nanomedicine materials and devices / Biomagnetic nanoparticles and clusters


	<b>Masaaki Kitano</b>
	Associate Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Catalysis / inorganic material / Ammonia synthesis / Acid and base catalyst
<b>Current Research Projects</b>	Ammonia synthesis using electride-based catalyst / Synthesis of alloy nanoparticle catalyst / Selective hydrogenation reactions

	<b>Yutaka Majima</b>
	Professor
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	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Molecular devices / Single-electron devices / Scanning probe microscopy / Nanoscale electrical properties
<b>Current Research Projects</b>	Molecular Transistors / Single-Electron Transistors / Nanoscale Electro- and Electroless-Plating / Analysis of Electrical Properties of Nanomaterials by Scanning Tunneling Microscopy (STM) and Scanning Tunneling Spectroscopy (STS)

	<b>Akifumi Matsuda</b>
	Associate Professor (Lecturer)
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	<b>Major</b> Energy Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	Electronic and energy materials / Inorganic thin films and nanomaterials / Atomic-scale material processing / New materials development
<b>Current Research Projects</b>	Synthesis of glass-based thermoelectric materials / low-temperature epitaxy of wide band-gap semiconductors / Self-assembled nanomaterials


	<b>Satoru Matsuishi</b>
	Associate Professor
	matsuishi ● mces.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Solid state chemistry / Inorganic functional materials / Electronic Structure Analysis
<b>Current Research Projects</b>	Functional mixed-anion materials / Inorganic phosphor materials / Superconductor / Electrides

	<b>Nobuhiro Matsushita</b>
	Associate Professor
	matsushita.n.ab ● m.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Human Centered Science and Biomedical Engineering
<b>Research Field</b>	Solution process / Functional ceramics / Electronic materials / Biomedical materials
<b>Current Research Projects</b>	Solution-processed transparent conductive oxide film / Conducted noise suppressing material in GHz range / Nanostructure fabrication for solid oxide fuel cells / Surface modification for nanostructured bioactive interface / Sensors device using ceramics electrode


	<b>Sachiko Matsushita</b>
	Associate Professor
	matsushita.s.ab ● m.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Energy conversion / Colloid / Thermoelectric / Plasmon
<b>Current Research Projects</b>	Sensitized thermal cell / Plasmonic color


# Inorganic Materials


Replace ● by @ in e-mail address upon sending e-mail.


	<b>Masahiro Miyauchi</b>
	Professor
	mmiyauchi ● ceram.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	Photoelectrochemistry / Catalysis / Semiconductor / Wet chemical synthesis
<b>Current Research Projects</b>	Photocatalysis / Solar cell / Artificial photosynthesis / Methane reforming


	<b>Akira Nakajima</b>
	Professor
	anakajim ● ceram.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Inorganic environmental materials / Surface wettability control / Ceramics processing
<b>Current Research Projects</b>	Superwettability / Dynamic wettability / Photocatalyst


	<b>Kazutaka Nakamura</b>
	Associate Professor
	nakamura.k.ai ● m.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Solid state physics with laser / Laser science / Ultrafast phenomena / Inorganic materials science
<b>Current Research Projects</b>	Coherent control of electron-phonon coupled system


	<b>Fumiyasu Oba</b>
	Professor
	oba ● msl.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Computational materials science / Inorganic materials science / Electronic materials / Energy materials
<b>Current Research Projects</b>	Computational exploration of novel semiconductors / Systematic investigation of point defects in semiconductors / Development of computational methods for materials exploration


	<b>Takao Sasagawa</b>
	Associate Professor
	sasagawa ● msl.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Inorganic electronic material / Superconductivity / Spintronics / Novel nanomaterial
<b>Current Research Projects</b>	Exploration of innovative electronic materials such as topological insulators and superconductors / Computational material search and design / Single-crystal growth / Magnetotransport and spectroscopic measurements.

	<b>Kazuo Shinozaki</b>
	Professor
	ksino ● ceram.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Ceramic thin film / Ceramic processing / Ceramic sensor / Ceramics for energy use
<b>Current Research Projects</b>	Oxide ion conducting thin films for Fuel cell and sensor / Electrooptic thin film / Oxide electrode material for low temperature operation

	<b>Tomofumi Tada</b>
	Associate Professor
	tada.t.ae ● m.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Computational materials science / Molecular electronics / Inorganic materials / Quantum transport theory
<b>Current Research Projects</b>	Fuel Cells / Catalysis / Molecular device / Quantum Information


	<b>Hiroaki Takeda</b>
	Associate Professor
	htakeda ● ceram.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Human Centered Science and Biomedical Engineering
<b>Research Field</b>	Crystal chemistry / Crystal growth / Electronic device / Biosensor
<b>Current Research Projects</b>	Development of piezo-type combustion sensors / Fabrication of novel SAW biosensor / Bulk single crystal growth of functional oxide materials


	<b>Tomoyasu Taniyama</b>
	Associate Professor
	taniyama.t.aa ● m.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Magnetism / Nano-scale magnetism / Spintronics / Multiferroics
<b>Current Research Projects</b>	Magnon tunneling across magnetic interfaces / Electric field generation of spin wave excitation / Electric field switching of magnon propagation mode / Antiferromagnetic magnetization control


	<b>Takeharu Tsuge</b>
	Associate Professor
	tsuge.t.aa ● m.titech.ac.jp
	<b>Major</b> Human Centered Science and Biomedical Engineering / Materials Science and Engineering
<b>Research Field</b>	Bio-based plastic / Biodegradable polymer / Bioprocess / Chemolithotrophic bacteria
<b>Current Research Projects</b>	Biosynthesis and characterization of structurally new microbial polyesters


# Inorganic Materials


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	<b>Takaaki Tsurumi</b>
	Professor
	ttsurumi ● ceram.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	dielectrics/ferroelectrics/piezoelectrics/electroceramics
<b>Current Research Projects</b>	Development of energy storage capacitor/Development of high temperature capacitor/Reliability of multi-layered capacitor/Development of ultrasonic transducers


	<b>Fumihiro Wakai</b>
	Professor
	wakai.f.aa ● m.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Engineering ceramics / Sintering/Superplasticity
<b>Current Research Projects</b>	3D visualization of microstructural evolution in sintering

	<b>Tetsuji Yano</b>
	Professor
	tetsuji ● ceram.titech.ac.jp
	<b>Major</b> Materials Science and Engineering
<b>Research Field</b>	Inorganic glass materials / Photonic materials / High-temperature chemistry / Ion dynamics in materials/ Nuclear waste vitrification
<b>Current Research Projects</b>	Combinatorial material processing / In situ vitrification analysis / Chemical strengthening of glass / Optical MEMS

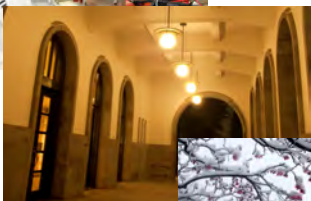
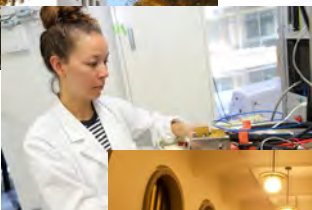
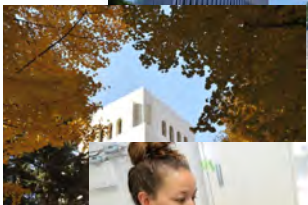
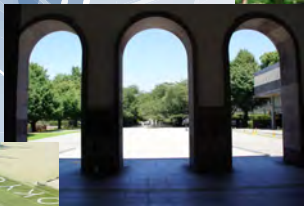
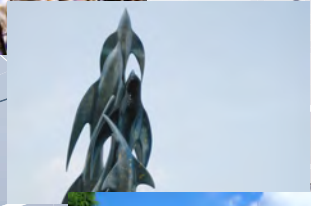
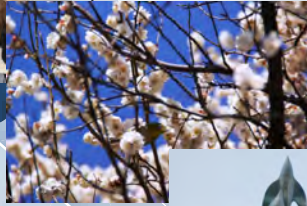
	<b>Toyohiko Yano</b>
	Professor
	tyano ● nr.titech.ac.jp
	<b>Major</b> Nuclear Engineering
<b>Research Field</b>	Ceramic materials for nuclear and fusion applications / Severe environment resistant materials / Ceramic-based composites / Electron microscopy
<b>Current Research Projects</b>	Neutron irradiation damage of ceramics / Processing of high-temperature materials

	<b>Kouichi Yasuda</b>
	Associate Professor
	kyasuda ● ceram.titech.ac.jp
	<b>Major</b> Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Engineering ceramics / Solid mechanics / Statistical mechanics / Reliability
<b>Current Research Projects</b>	Stochastic analysis on ceramic granule collapse in powder compact during cold isostatic pressing / A theory on estimating internal stress during sintering of ceramic multiphase laminates / Easy-to-use torsion test Method and multi-axial fracture criteria / Weibull statistics of porous ceramics / Numerical simulation of linearity in Weibull plot

	<b>Katsumi Yoshida</b>
	Associate Professor
	k-yoshida ● lane.iir.titech.ac.jp
	<b>Major</b> Nuclear Engineering
<b>Research Field</b>	Severe environment resistant materials / Materials for nuclear and fusion applications / Ceramic-based composites / Porous ceramics
<b>Current Research Projects</b>	Development of high performance ceramic-based composites / High performance porous ceramics based on microstructure control / Development of novel severe environment resistant ceramics

	<b>Mamoru Yoshimoto</b>
	Professor
	yoshimoto.m.aa ● m.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	Solar cells / Inorganic thermoelectric materials / Surface nano-functionalization / Superconducting/Magnetic materials
<b>Current Research Projects</b>	UV Solar cells / Flexible glassy thermoelectric materials / Development of novel uniaxial pressure-induced thin film crystallization process





# Department of Chemical Science and Engineering

## Vision

Creating a future with no bounds using expertise in chemistry

The study of chemistry is for clarifying the laws of material conversion, for synthesizing unknown compounds, and for clarifying the mechanisms of manifestations of physical properties. In the Department of Chemical Science and Engineering, our aim is to deeply understand the basic properties and the responsiveness of substances at an atomic and molecular level, and to study the most advanced chemical technology systems. In the curriculum, study and education goals are set in order to develop individuals who are capable of pioneer chemical technologies that are essential for sustaining a rich society. Our aim is to produce scientists, engineers, and researchers who can take responsibility for society and the environment in the 21st century, and expert professionals who open new industries and civilizations.


## Message from the Department Chair


We live surrounded by a multitude of different chemically processed materials. The clothes we wear, the plastic on computer components, the medicine we take and the fuel we use in our cars are some examples of what humans have created to make our lives better. In order to maintain and develop our society we must find sustainable ways to obtain these materials. It is the goal of the Department of Chemical Science and Engineering to deeply understand chemical phenomena in all their forms, from research into atomic and molecular interactions, to studies on global dynamics. We endeavor to offer a leading-edge education to aspiring scientists and engineers who will build a better tomorrow. (Teruoki Tago)





# Synthesis and Transformation


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	<b>Munetaka Akita</b>
	Professor
	makita ● res.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Organometallic chemistry / Organic chemistry / Photochemistry / Catalytic chemistry
Current Research Projects	photoredox catalysis / organometallic molecular device


	<b>Shinsuke Inagi</b>
	Associate Professor
	inagi ● echem.titech.ac.jp
	Major Energy Science and Engineering / Chemical Science and Engineering
Research Field	Organic electrosynthesis / Functional polymer / Polymer synthesis / Electrochemical device
Current Research Projects	Organic electrosynthesis / Functional polymer


	<b>Takashi Ishizone</b>
	Professor
	tishizon ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer synthesis / Functional polymer/ Organic chemistry
Current Research Projects	Living anionic polymerization of functional monomers/ Synthesis of polymers containing adamantyl groups/ Synthesis of water-soluble thermoresponsive polymers

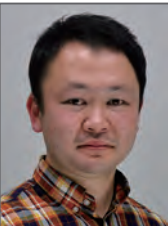
	<b>Shigekazu Ito</b>
	Associate Professor
	ito.s.ao ● m.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Physical organic chemistry / Organic synthesis / Catalysis
Current Research Projects	Open-shell singlet heterocycles toward functional materials, Low-coordinated phosphines for (chiral) gold catalysis


	<b>Gen-ichi Konishi</b>
	Associate Professor
	gkonishi ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer science / Photochemistry / Bioimaging / Physiology
Current Research Projects	Functional Fluorescent Dye / Bioimaging / Polymer synthesis

	<b>Koichi Mikami</b>
	Professor
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	Major Chemical Science and Engineering
Research Field	Organic chemistry / Organometallic chemistry / Organofluorine chemistry / Material science
Current Research Projects	Multicomponent coupling / BNCT drugs / Difluoromethylation / Anti-Alzheimer drugs / Perfluoro iso-propylation / Tropos catalysts for ester hydrogenation

	<b>Tetsuro Murahashi</b>
	Professor
	mura ● apc.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Organometallic chemistry / Coordination chemistry / Catalysis / Inorganic chemistry
Current Research Projects	Synthetic inorganic and organometallic chemistry / Inorganic and Organometallic reaction chemistry

	<b>Reiko Saito</b>
	Associate Professor
	rsaito ● polymer.titech.ac.jp
	Major Energy Science and Engineering / Chemical Science and Engineering
Research Field	Polymer synthesis / Polymer reaction / Composites / Nano materials
Current Research Projects	Developing novel organic-silica nanocomposites/ Developing novel functional polymers for energy devices/ Developing nano-particles/ Controlling nanostructures of organic-silica nanocomposites/Controlling radical polymerization of multi-vinyl monomers


	<b>Koichiro Takao</b>
	Associate Professor
	ktakao ● lane.iir.titech.ac.jp
	Major Nuclear Engineering
Research Field	Coordination chemistry of actinides / Ionic liquids / Nuclear fuel cycle / Treatment and disposal of nuclear wastes
Current Research Projects	Fundamental Study on Advanced Nuclear Fuel Reprocessing Based on Actinide Coordination Chemistry / Retrieval of Long-lived Fission Products from Vitrified Nuclear Wastes / Microwave-assisted Solvent Extraction of Platinum Group Metals / Exploring Catalytic Activity of Uranyl Complexes


	<b>Toshikazu Takata</b>
	Professor
	ttakata ● polymer.titech.ac.jp
	Major Chemical Science and Engineering / Energy Science and Engineering
Research Field	Synthesis of new polymers / Topological molecules / Helical molecules / Polymer science
Current Research Projects	Synthesis and Application of Nitrile N-Oxide / Synthesis and Application of Rotaxane Cross-Linker / Polymer Reaction Using Metal-containing Macrocycle





# Synthesis and Transformation


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	<b>Hiroshi Tanaka</b>
	Associate Professor
	thiroshi ● apc.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Natural product chemistry / Synthetic organic chemistry / Chemical biology / Carbohydrate chemistry
Current Research Projects	Synthesis of 18F PET tracers / Synthesis of food-orientated natural products / Synthesis of biologically important carbohydrates

	<b>Ikuyoshi Tomita</b>
	Professor
	tomita ● echem.titech.ac.jp
	Major Energy Science and Engineering / Chemical Science and Engineering
Research Field	Polymer synthesis / Polymer reaction / Functional polymer / Organometallic chemistry
Current Research Projects	Synthesis of Elements-block $\pi$ -Conjugated Polymers / Living Coordination Dispersion Polymerization / Three-component Polycondensation Processes


	<b>Michito Yoshizawa</b>
	Associate Professor
	yoshizawa.m.ac ● m.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Supramolecular chemistry / Nanospace chemistry / Material chemistry
Current Research Projects	Development of functional polyaromatic nanospaces


	<b>Ken Tanaka</b>
	Professor
	ktanaka ● apc.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Organic synthesis / Organometallic chemistry / Asymmetric catalysis
Current Research Projects	(Asymmetric) Catalysis for Construction of Non-Centro Chiralities / (Asymmetric) Catalysis for Construction of Multiple-Centro Chiralities / (Asymmetric) Catalysis Using Cationic Transition-Metal Complexes / (Asymmetric) Synthesis of Novel Organic Molecules


	<b>Satoshi Uchida</b>
	Associate Professor (Lecturer)
	suchida ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer synthesis / Polymer materials / Branching polymers / Nanostructured polymers
Current Research Projects	Living radical polymerization of methacrylates / Synthesis of graft polymers / Synthesis of thermoresponsive polymers


# Functions and Physical Properties


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	<b>Toshihide Baba</b>
	Professor
	baba.t.ab ● m.titech.ac.jp
	<b>Major</b> Human Centered Science and Biomedical Engineering / Chemical Science and Engineering
<b>Research Field</b>	Catalyst and enzyme / Methane transformation / Biomass conversion / Oxidation reaction and oxidative stress
<b>Current Research Projects</b>	Methane transformation with solid catalyst and enzyme / Mechanism of oxidative stress due to phenol derivatives / butadiene production from ethanol with metal oxides / Selective production of primary alcohol from alkane


	<b>Hidemine Furuya</b>
	Associate Professor
	hfuruya ● polymer.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Polymer structure / Polymer property / Molecular simulation
<b>Current Research Projects</b>	Mechanism of helix-sense inversion of polyaspartates / Orientation and properties for surface-grafted polypeptides / Molecular dynamics simulations of polymer chains


	<b>Masahiko Hara</b>
	Professor
	masahara ● echem.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Self-assembly and organic thin films / Nanotechnology / Surface and interface chemistry / Chemical evolution and origins of life
<b>Current Research Projects</b>	High resolution STM and AFM studies of self-assembled monolayers, bio-interfaces, and devices / Development of highly sensitive tip-enhanced and surface-enhanced optical microscopy and spectroscopy with nanostructures / Nano-spectroscopic approaches to chemical evolution and origins of life at mineral-organic interfaces


	<b>Taro Hitosugi</b>
	Professor
	hitosugi.t.aa ● m.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	solid-state chemistry / solid-state electrochemistry / thin films / surfaces and interfaces
<b>Current Research Projects</b>	solid-state Li batteries / functional oxide thin films / hydride thin films / scanning tunneling microscopy


	<b>Akira Ito</b>
	Professor
	aito ● chemeng.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Chemical engineering / Separation technology / Membrane separation
<b>Current Research Projects</b>	Liquid membrane for gas and vapor separation

	<b>Susumu Kawauchi</b>
	Associate Professor
	skawauch ● polymer.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering / Materials Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Computational chemistry / Quantum chemical calculation / Molecular dynamics simulation
<b>Current Research Projects</b>	MD simulation of thermal conductivity of liquid crystals / Theoretical prediction of band gap of conducting polymers / Theoretical exploring of reaction mechanism for catalytic reactions

	<b>Fusao Kitamura</b>
	Associate Professor
	kitamura ● echem.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Chemical Science and Engineering
<b>Research Field</b>	Fundamental electrochemistry / Spectroscopic analysis of electrochemical processes / Design of functional electrodes / Electrode catalyst for fuel cells
<b>Current Research Projects</b>	Catalyst synthesis for polymer electrolyte fuel cells / In situ spectroscopic study of electrochemical reaction processes / Development of electrochemical evaluation techniques for battery performance


	<b>Keiji Nagai</b>
	Associate Professor
	nagai.k.ae ● m.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Nuclear Engineering / Chemical Science and Engineering
<b>Research Field</b>	Photoenergy conversion materials / Chemical devices / Laser-induced quantum beam
<b>Current Research Projects</b>	Target Materials for Laser Energy Conversion / Organophotocatalysis


	<b>Ken Nakajima</b>
	Professor
	knakaji ● polymer.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Polymer nanomechanics / Polymer physics / Rubber/elastomer materials
<b>Current Research Projects</b>	nanomechanical property mapping by atomic force microscope on various polymeric materials / development of nanorheological measurement based on atomic force microscope, Investigation of rubber-filler interface / heterogeneous stress distribution of stretched rubber

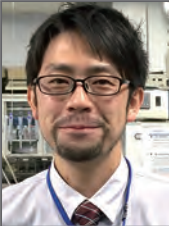
	<b>Akira Ohtomo</b>
	Professor
	aohtomo ● apc.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering / Materials Science and Engineering
<b>Research Field</b>	Inorganic solid-state chemistry / Crystal engineering / Oxide electronics
<b>Current Research Projects</b>	Materials and chemical research in the field of complex metal oxides and hydrides for novel electronic and magnetic properties / Epitaxial growth of oxide semiconductors for visible-light driven water splitting and power electronics applications / Electrochemical induction of normal to superconducting transitions

# Functions and Physical Properties

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	<b>Takeshi Serizawa</b>
	Professor
	serizawa ● polymer.titech.ac.jp
	<div>Major</div> Chemical Science and Engineering
<div>Research Field</div>	Biopolymer / Natural polymer / Self-assembly / Surface and interfacial chemistry
<div>Current Research Projects</div>	Enzymatic synthesis and applications of cellulose oligomers and their derivatives / Identification and applications of polymer-binding peptides / Assembly and applications of filamentous bacteriophages

	<b>Atsushi Shishido</b>
	Professor
	ashishid ● res.titech.ac.jp
	<div>Major</div> Energy Science and Engineering / Chemical Science and Engineering
<div>Research Field</div>	Polymer / Light / Liquid crystal / Material
<div>Current Research Projects</div>	Design of functional films for photonic and mechanical applications


	<b>Yusuke Shimoyama</b>
	Associate Professor
	yshimo ● chemeng.titech.ac.jp
	<div>Major</div> Chemical Science and Engineering / Energy Science and Engineering
<div>Research Field</div>	Supercritical fluid / Separation Engineering / Material Process
<div>Current Research Projects</div>	Supercritical extraction of emulsion for nanosuspension / sol-gel reaction in supercritical carbon dioxide / Supercritical drying for carbon electrode fabrication


	<b>Takuo Tanaka</b>
	Specially Appointed Professor
	t-tanaka ● riken.jp
	<div>Major</div> Chemical Science and Engineering
<div>Research Field</div>	Metamaterials / Optics and photonics / Nano materials / Nano fabrication / Optical and spectroscopic measurement
<div>Current Research Projects</div>	Metamaterial absorber and its application for molecular detection / 3D optical metamaterials / Development of fabrication techniques for 3D metamaterials / Ultra low frequency tip-enhanced near-field scanning Raman microscopy





# Materials Structure and System


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	<b>Shinji Ando</b>
	Professor
	sando ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer functional materials / Polymer spectroscopy / Polymers for optical applications / Polymer inorganic hybrid materials
Current Research Projects	Aggregation structure and optical properties of aromatic polymer films at very high pressure (~10GPa) / Molecular design, synthesis and photo-physical properties of highly fluorescent & phosphorescent polyimides / Wavelength and light intensity dependences of photoconductivity of polymer films / Structural analysis of polymer thin films using VT pMAIRS spectroscopy and synchrotron X-ray diffraction

	<b>Takanori Fukushima</b>
	Professor
	fukushima ● res.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Physical organic chemistry / Functional $\pi$ -electronic materials / Functional polymer materials / Molecular assembly
Current Research Projects	Electronic and optoelectronic organic materials / Functional soft materials / New methods for materials synthesis


	<b>Masatoshi Kubouchi</b>
	Professor
	mkubouch ● chemeng.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Materials for chemical equipment / Composites / Epoxy resin / Smart structure / Risk Based Maintenance / Graphene
Current Research Projects	Evaluation of durability of plastic / Creation of furan resin based green composite / Mass production of high-aspect-ratio few-layer-graphene by high-speed laminar flow


	<b>Shuichi Nojima</b>
	Professor
	snojima ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer blend / Morphology formation / Self assembly / Synchrotron small-angle x-ray scattering
Current Research Projects	Confined crystallization of polymer chains / Interactive crystallization of block copolymers / Structures and properties of bio-based polymers


	<b>Kohtaro Osakada</b>
	Professor
	kosakada ● res.titech.ac.jp
	Major Chemical Science and Engineering / Materials Science and Engineering
Research Field	Organotransition metal chemistry / Polymer synthesis / Supramolecules
Current Research Projects	Polymetallic complexes with Si- and Ge- ligands/ Functions of supramolecules in single crystals

	<b>Saiko Aoki</b>
	Associate Professor
	saoki ● chemeng.titech.ac.jp
	Major Chemical Science and Engineering / Energy Science and Engineering
Research Field	Tribology / Lubricant chemistry / Surface modification / Surface chemistry
Current Research Projects	Friction-reducing mechanism of organic polymers having multiple adsorption sites / Tribological characteristic of a fingertip on an organic molecular film-coated surface / Synergistic friction-reducing effect between surface roughness and adsorbed molecular films

	<b>Take-aki Koizumi</b>
	Associate Professor
	tkoizumi ● res.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Coordination chemistry / Organometallic chemistry / Catalytic reaction / Electrochemistry
Current Research Projects	Development of transition metal catalysts for environmental low-loaded reactions / Electrochemical reduction of carbon dioxide / Electrochemistry of organotransition metal complexes


	<b>Shigeki Kuwata</b>
	Associate Professor
	skuwata ● apc.titech.ac.jp
	Major Chemical Science and Engineering / Energy Science and Engineering
Research Field	Coordination chemistry / Organometallic chemistry / Homogeneous catalysis
Current Research Projects	Synthesis and catalytic application of metal-ligand cooperative bifunctional molecular catalysts / Synthesis of metal cluster compounds / Redox conversion of nitrogenous compounds


	<b>Junko Nomura</b>
	Associate Professor
	jnomura ● res.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Catalytic reaction chemistry / Infrared spectroscopy / Ordered porous materials / Reaction mechanism
Current Research Projects	Fabrication of ordered porous catalysts, Clarification of reaction mechanisms on solid surfaces


	<b>Hideyuki Otsuka</b>
	Professor
	otsuka ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer chemistry / Polymer reactions / Dynamic covalent chemistry / Chemistry of soft materials
Current Research Projects	Polymer reactions based on dynamic covalent chemistry / Preparation and evaluation of self-healing polymers / Synthesis and characterization of mechanochromic polymers

# Materials Structure and System

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	<b>Mitsuru Satoh</b>
	Associate Professor
	msatoh ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polyelectrolytes (solution systems) / Polymer gels / Colloids
Current Research Projects	Development of DRY MATTER as novel CO <sub>2</sub> absorption material / Elucidation of electrostatic effects on the hydrophobic interaction


	<b>Masatoshi Tokita</b>
	Associate Professor
	mtokita ● polymer.titech.ac.jp
	Major Chemical Science and Engineering
Research Field	Polymer structures / Polymer properties / Polymer liquid crystals / Soft materials
Current Research Projects	Creation of optical films using soft materials / Macroscopic orientation of microdomains of liquid crystalline block copolymers / Surface modification using polymer brushes / Nanoparticle dispersion using polymer brushes


	<b>Daisuke Takeuchi</b>
	Associate Professor
	dtakeuch ● res.titech.ac.jp
	Major Energy Science and Engineering / Chemical Science and Engineering
Research Field	Polymer chemistry / Organometallic chemistry / Organic chemistry
Current Research Projects	Polymerization of new olefin monomers / Multimetallic catalyst for olefin polymerization / Metal catalyst with cyclic ligands


# Nano and Device


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	<b>Hajime Arai</b>
	Professor
	arai.h.af m.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Chemical Science and Engineering
<b>Research Field</b>	Energy storage device / Electrochemistry / Material Science
<b>Current Research Projects</b>	Zinc Air Battery / Aqueous Battery/ Advanced interfacial analysis


	<b>Masaaki Hirayama</b>
	Associate Professor
	hirayama echem.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Chemical Science and Engineering
<b>Research Field</b>	Solid state chemistry / Energy conversion materials / Lithium ion batteries / Design of electrochemical interface
<b>Current Research Projects</b>	Development of next-generation batteries (all solid-state battery / Li-ion battery / photo-rechargeable battery)


	<b>Manabu Ihara</b>
	Professor
	mihara chemeng.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Chemical Science and Engineering
<b>Research Field</b>	Solid oxide fuel cells / Plasmonic solar cells / Direct carbon fuel cells / Design of energy system
<b>Current Research Projects</b>	


	<b>Takane Imaoka</b>
	Associate Professor
	timaoka res.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Physical chemistry / Coordination chemistry / Advanced material chemistry / Nanoparticle / Cluster science
<b>Current Research Projects</b>	Structural analysis and functionalization of subnanoparticles


	<b>Ryoji Kanno</b>
	Professor
	kanno echem.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Chemical Science and Engineering
<b>Research Field</b>	Solid-state chemistry / Ionic conductors /All solid-state battery / Lithium battery / Fuel cell
<b>Current Research Projects</b>	

	<b>Ken Motokura</b>
	Associate Professor (Lecturer)
	motokura chemenv.titech.ac.jp
	<b>Major</b> Human Centered Science and Biomedical Engineering / Chemical Science and Engineering
<b>Research Field</b>	Catalysis / Organic chemistry / Carbon dioxide transformation / Multifunctional catalyst surface
<b>Current Research Projects</b>	Catalysis for highly efficient molecular transformation / Design of multifunctional catalytic surface for organic synthetic reactions / Catalytic transformation of carbon dioxide to valuable chemicals

	<b>Toshiro Takao</b>
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	takao.t.aa m.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Organometallic chemistry / Coordination chemistry / Cluster chemistry / Chemistry of catalysis
<b>Current Research Projects</b>	Development of cluster catalysis / Sythesis of mixed-ligand polyhydrido cluster / Synthesis of heterometallic cluster / Activation of small molecules using polyhydrido cluster

	<b>Izumi Taniguchi</b>
	Associate Professor
	itaniguc chemeng.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Nanostructure material processing / Energy storage device / Aerosol technology / Powder engineering/ Chemical engineering
<b>Current Research Projects</b>	Synthesis of nanostructured electrodes for lithium sulfur and lithium ion batteries by using aerosol and powder technologies / Development of novel energy storage devices


	<b>Takehiko Tsukahara</b>
	Associate Professor
	ptsuka lane.iir.titech.ac.jp
	<b>Major</b> Nuclear Engineering
<b>Research Field</b>	Nuclear Analytical Chemistry / Radioactive Waste Management / Nuclear Fuel Cycle / Functional Nanomaterial
<b>Current Research Projects</b>	Microfluidic-based analysis and separation of radionuclides / Creation of photonic crystal polymer for metal ion sensing / Novel phase-transition-based solvent extraction of target radionuclides


	<b>Hiroyuki Wada</b>
	Associate Professor
	wada.h.ac m.titech.ac.jp
	<b>Major</b> Energy Science and Engineering / Materials Science and Engineering / Chemical Science and Engineering
<b>Research Field</b>	Photofunctional chemistry / Nano material / Laser
<b>Current Research Projects</b>	Preparation of nanoparticle by laser process / Photoacoustic bioimaging by organic nanoparticles /Cancer treatment by photodynamic therapy / Quantum dot sensitized solar cell / Lithium ion battery using nanoparticles for electrode/ Nanophosphors for white light emitting diode




# Nano and Device

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	<b>Keiko Waki</b>
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	Major Energy Science and Engineering
Research Field	Materials engineering / Chemical engineering / Electrochemistry / Battery
Current Research Projects	Engineering of carbonnanotube for battery electrode application


	<b>Kimihisa Yamamoto</b>
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	Major Chemical Science and Engineering
Research Field	Macromolecular chemistry / Inorganic chemistry / Nanoscience / Material Science
Current Research Projects	Atom hybridization / Synthesis of Subnano metal Particles /Development of Advanced Nano-materials


	<b>Ichiro Yamanaka</b>
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	Major Chemical Science and Engineering / Energy Science and Engineering
Research Field	Post-fuel cell / Energy conversion chemistry / Material conversion chemistry / Green chemistry
Current Research Projects	Direct conversion of methane to higher hydrocarbons by new catalyst / Direct electrochemical synthesis of organic hydride by new electrocatalyst


# Environment, Catalysis and Process

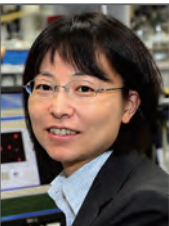
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<b>Research Field</b>	
<b>Current Research Projects</b>	


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	<b>Major</b> Nuclear Engineering
<b>Research Field</b>	Energy storage and conversion / Carbon recycling energy system / Energy carrier / Nuclear energy system
<b>Current Research Projects</b>	Thermochemical energy storage materials and systems / Active carbon recycling energy system / Innovative hydrogen permeation membrane / Low carbon nuclear energy system


	<b>Shinsuke Mori</b>
	Associate Professor
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	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Plasma chemistry/ Plasma surface modification / Plasma reforming / Nanomaterial synthesis
<b>Current Research Projects</b>	Synthesis of nanocarbon materials/ Plasma surface modification/ Plasma CO2 reforming/ Ammonia synthesis by non-thermal plasma


	<b>Masaki Okamoto</b>
	Associate Professor
	okamoto ● cap.mac.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Porous materials / Heterogeneous catalysis / Nanomaterials chemistry
<b>Current Research Projects</b>	Controlling shapes and structures of porous materials / Hybrid heterogeneous catalysts between inorganic materials and polymers


	<b>Mina Okochi</b>
	Professor
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	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Biotechnology / Peptide technology / Bioelectronics / Biomedical engineering
<b>Current Research Projects</b>	Peptide-based biosensors/ Screening of functional peptides / IgE epitope analysis for allergy analysis

	<b>Shinichi Ookawara</b>
	Specially Appointed Associate Professor
	sokawara ● chemeng.titech.ac.jp
	<b>Major</b> Chemical Science and Engineering
<b>Research Field</b>	Microreactor / Microfluidic device / CFD
<b>Current Research Projects</b>	3D (Printed) Micro/Mini-Fluidic Devices for Chemical, Environmental and Energy process applications

	<b>Hidetoshi Sekiguchi</b>
	Professor
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	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Plasma processing / Reaction engineering with high energy density field / Thermal energy engineering / Environmental chemical engineering
<b>Current Research Projects</b>	Bioenergy conversion using external energetic fields including plasma, ultrasound, and molten salt / Preparation of functional materials using various plasmas / Chemical energy storage


	<b>Eiichi Suzuki</b>
	Associate Professor
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<b>Research Field</b>	
<b>Current Research Projects</b>	


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	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Chemical engineering / Catalysis and reaction engineering / Petrochemical / Biomass
<b>Current Research Projects</b>	Synthesis of metal-encapsulated zeolites and their application for catalytic reaction / Synthesis of carbon supported metal catalysts and their application for biomass conversion


	<b>Takanori Tamaki</b>
	Associate Professor (Lecturer)
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	<b>Major</b> Chemical Science and Engineering / Energy Science and Engineering
<b>Research Field</b>	Chemical engineering / Systematic material design / Fuel cell / Bio-inspired materials
<b>Current Research Projects</b>	Improving the performance of polymer electrolyte fuel cells / Development of electrodes and membrane electrode assemblies for solid alkaline fuel cells with liquid fuels / High-power-density enzymatic biofuel cells / Molecular recognition gating membrane using DNA-conjugated thermoresponsive polymer


# Environment, Catalysis and Process


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	<div>Major</div> Chemical Science and Engineering / Energy Science and Engineering
<div>Research Field</div> Atmospheric chemistry / Earth and environmental chemistry / Material cycle analysis / Analytical chemistry	
<div>Current Research Projects</div> Global budget analysis of atmospheric nitrous oxide / Impact of ocean acidification on the production of nitrous oxide / Global cycle analysis of atmospheric molecular hydrogen	

	<b>Yuji Wada</b>
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	<div>Major</div> Energy Science and Engineering / Chemical Science and Engineering
<div>Research Field</div> Nano-materials chemistry / Photochemistry / Microwave-driven chemistry	
<div>Current Research Projects</div> Accelerating chemical reactions by microwave heating / Accelerating effects of microwave for electron transfer / Photoinductive charge isolation by alternately stacked multilayer structure / Nano-structure Characterization for dye-sensitized and Perovskite-sensitized solar cells	

	<b>Keita Yamada</b>
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	<div>Major</div> Chemical Science and Engineering / Energy Science and Engineering
<div>Research Field</div> Isotopomics / Organic geochemistry / Environmental chemistry / Isotope geochemistry	
<div>Current Research Projects</div> Source identification of volatile organic compounds in the atmosphere / Development of diagnosis of disease based on stable isotopic changes in metabolites / Discrimination between natural and synthetic organic compounds in foods based on stable isotopic signatures	

	<b>Takeo Yamaguchi</b>
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	<div>Major</div> Chemical Science and Engineering / Energy Science and Engineering
<div>Research Field</div> Chemical engineering / Fuel cell materials and systems / Bio-inspired membranes / Membrane Science and Technology	
<div>Current Research Projects</div> Electrolyte membranes and electro-catalysts for polymer electrolyte fuel cells and solid alkaline fuel cells / Functionalized membranes inspired from bio-systems / Materials for water splitting / Antifouling membrane materials for water treatment	

	<b>Naohiro Yoshida</b>
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	<div>Major</div> Chemical Science and Engineering / Energy Science and Engineering / Global Engineering for Development Environment and Society
<div>Research Field</div> Environmental chemistry / Geochemistry / Analytical chemistry / Isotope chemistry	
<div>Current Research Projects</div> Isotopologue tracers for environmental diagnosis / Material cycle analysis with isotopomers / Food and beverage authenticity with isotopologue tracers / Origin of the Earth and life through isotopomers / Biomedical diagnosis with isotopologues	

	<b>Shiro Yoshikawa</b>
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	<div>Major</div> Chemical Science and Engineering
<div>Research Field</div> Transport phenomena / Membrane separation / Mixing operation	
<div>Current Research Projects</div>	



# Alphabetical Index by Major

## Materials Science and Engineering

Shigeo Asai	Associate Professor	MSE	P7
Masaki Azuma	Professor	MSE	P9
Yasuo Azuma	Associate Professor	MSE	P9
Toshiyuki Fujii	Professor	MSE	P4
Hiroshi Funakubo	Professor	MSE	P9
Yoshihiro Gohda	Associate Professor	MSE	P4
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Teruaki Hayakawa	Associate Professor	MSE	P7
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Miyuki Hayashi	Associate Professor	MSE	P4
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Hideo Hosono	Professor	MSE	P9
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Ken Ishikawa	Associate Professor	MSE	P7
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Masanori Kajihara	Professor	MSE	P4
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Takeshi Kikutani	Professor	MSE	P7
Yoshisato Kimura	Associate Professor	MSE	P4
Yoshitaka Kitamoto	Professor	MSE	P10
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Shinji Kumai	Professor	MSE	P5
Yutaka Majima	Professor	MSE	P10
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Sachiko Matsushita	Associate Professor	MSE	P10
Tsuyoshi Michinobu	Associate Professor	MSE	P7
Masahiro Miyauchi	Professor	MSE	P11
Takehiko Mori	Professor	MSE	P7
Junko Morikawa	Professor	MSE	P7
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Susumu Onaka	Professor	MSE	P5
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Yukio Ouchi	Professor	MSE	P7
Toshiaki Ougizawa	Professor	MSE	P8
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Martin Vacha	Professor	MSE	P8
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Fumihiko Wakai	Professor	MSE	P12
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Kouichi Yasuda	Associate Professor	MSE	P12
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Hidemine Furuya	Associate Professor	CSE	P17
Masahiko Hara	Professor	CSE	P17
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Taro Hitosugi	Professor	CSE	P17
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Take-aki Koizumi	Associate Professor	CSE	P19
Gen-ichi Konishi	Associate Professor	CSE	P15
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Shinsuke Mori	Associate Professor	CSE	P23
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Keiji Nagai	Associate Professor	CSE	P17
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Atsushi Shishido	Professor	CSE	P18
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Yuji Wada	Professor	CSE	P24
Keita Yamada	Associate Professor	CSE	P24
Takeo Yamaguchi	Professor	CSE	P24
Kimihisa Yamamoto	Professor	CSE	P22
Ichiro Yamanaka	Professor	CSE	P22
Naohiro Yoshida	Professor	CSE	P24
Shiro Yoshikawa	Associate Professor	CSE	P24
Michito Yoshizawa	Associate Professor	CSE	P16

## Energy Science and Engineering

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Sachiko Matsushita	Associate Professor	MSE	P10
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Reiko Saito	Associate Professor	CSE	P15
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Toyohiko Yano	Professor	MSE	P12
Katsumi Yoshida	Associate Professor	MSE	P12

## Global Engineering for Development Environment and Society

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