

As of April 1, 2017

2018 Teaching Staffs for the Doctoral Program (Engineering)  
The Graduate School of Science and Engineering, Yamagata University

**[Chemistry and Chemical Engineering]**

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Field	Contents of Education and Research	Instructors
Energy Conversion Engineering	<p>Development of heterogeneous catalysts such as immobilized enzymes and photocatalysts, and the physical properties and characteristics of those catalysts</p> <p>Basics and applications of electron transfer reactions at solid/liquid/gas interfaces, especially for their applications to the advanced battery systems such as lithium ion secondary batteries with battery management systems.</p> <p>Design of complex processes in which thermodynamic equilibrium theory and rate theory are combined to ensure high-level control of functions and structures of materials</p> <p>Optimization of components design and structure of energy storage devices such as batteries or capacitors, and information management of the manufacturing technologies of those devices</p> <p>Combustion theory as a basic knowledge of safety engineering and fire/explosion phenomena</p>	<p>* Tadahiro Aita, Prof.</p> <p>* Tatsuo Nishina, Prof.</p> <p>* Masahiro Shishido, Assoc. Prof.</p> <p>* Kazuhiro Tachibana, Assoc. Prof.</p> <p>* Kazunori Kuwana, Assoc. Prof.</p>
Organic Functional Chemistry	Molecular recognition, catalytic functions, transport, and self-organization of organic molecules and organic molecular devices	* Kazuaki Ito, Prof.
Materials conversion and instrumentation engineering	<p>Design, synthesis, and processing of functional ceramic materials, such as materials design of biomedical ceramics and morphology-controlling synthesis of inorganic solids</p> <p>Physical and chemical approaches to acquire materials information, and the construction of measurement systems including high-sensitivity instruments; methods of extracting high-level functions for separated measurement and simplified measurement tools</p> <p>Basics and applications of the creation of “intelligent ceramics” that change their electric conductivity according to the atmosphere, or emit luminescence against external stimuli such as applied electric fields and UV irradiation</p> <p>Optimization of the design and structure of the material constituting the battery, and the research on it's the measurement technology and monitoring</p>	<p>* Hideo Unuma, Prof.</p> <p>* Masatoshi Endo, Assoc. Prof.</p> <p>* Yuta Matsushima, Assoc. Prof.</p> <p>Tomohiro Ito, Assoc. Prof.</p>
Bioresource chemistry	Design and synthesis of functional materials using natural resources	* Bungo Ochiai, Prof.

Microsensor systems	Search for a novel oxide with a sensing function and development of a method for synthesizing such an oxide; and production of an oxide superconductor for magnetic sensors and evaluation of the physical properties thereof	*Shiro Kanbe, Prof.
Organic functional materials	Education and research about fabrication method of nanoparticles and nanocrystals including inorganic and polymer materials, and the application by layered structure of their nano-materials	*Akito Masuhara, Assoc.Prof.
Thermal fluid engineering and transport phenomena engineering	Flow and mixing patterns of miscible fluids in a chemical process; technologies for promoting heat transfer; control of velocity of heat transfer; and the use of a novel heating medium for heat transfer  The transfer of materials (mass transfer) through interfaces in fluid media that occur in the course of separation operations to diffuse specific substance materials	Hideki Tokanai, Assoc. Prof.  *Keigo Matsuda, Assoc. Prof.
Powder and particle materials	From kinetic property and adhesive force of the powders to the dispersion property using DLVO theory and, slurry dispersion effects of the surfactant, the water-soluble polymer and the coupling agent.  Mechanical operation, physical properties, and handling of powders	*Mitsumasa- Kimata, Prof.  *Naoya Kotake, Assist. Prof.
Organic functional materials chemistry	Design and synthesis of novel $\pi$ -conjugated molecules and their application in optical/electronic devices and chemo-/biosensors	*Hiroshi Katagiri, Assoc. Prof.
Organic Solar Cells	Contents of Education and Research Chemical processing of novel nanostructured inorganic/organic hybrid materials and their application to solar energy conversion	*Tsukasa Yoshida, Prof.

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**[Bioengineering]**

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Field	Contents of Education and Research	Instructors
Cell function analysis technology	Development of systems to analyze cellular respiration based on electrochemical measurement technology and application of novel measurement systems to analyze cell function and embryo quality in reproductive medicine  Analysis of a novel lung-derived bioactive substance using cell biological and molecular biological techniques	*Hiroyuki Abe, Prof.  *Reiko Kurotani, Assoc.Prof.
Biorobotics	Robots having flexible mechanisms and adaptive behavioral abilities similar to those of living creatures; and robotic microhands that enable micro manipulation of cells	*Kenji Inoue, Prof.
Bioresource chemistry	Creation, through synthesis, etc., of useful natural organic compounds and novel pharmaceuticals, modeled on the biosynthesis of organic compounds of natural resources  Structures of organisms and resources derived from organisms and chemical reactions thereof; synthesis of shape-selective catalysts that enables resource conversion reaction under moderate conditions and the characteristics of such synthesis  Chemical approach to control molecules with biogenic functions, and application thereof to organic synthesis; and the development of intelligent materials	*Shingo Sato, Prof. ☆  *Hideyuki Tagaya, Prof.  *Tatsuro Kijima, Assoc. Prof.
Biophysiological engineering	Analysing control mechanisms of cardiorespiratory system-from the standpoint of systems theory;development of noninvasive methods for measurements of biosignals and estimation of biological functions  Biometrics for respiratory and circulatory systems, and applied physiological analysis of biological information	*Kyuichi Niizeki, Prof. ☆  Tadashi Saitoh, Assist. Prof.
X-ray imaging and information	Development of medical imaging systems using synchrotron x-ray based on novel principles, and of image processing algorithms for clinical applications	*Tetsuya Yuasa, Prof.
Bio-materials science and engineering	Development of biosensors and methodology for analyses of molecular interaction networks in biosystems	Hiroyuki Furusawa, Assoc.Prof. ☆
Bio-functional Improvement Science	Study on multi-discipline fields of materials science, microbiology, and regenerative medicine aiming at improving vital human body functions	*Osamu Yamamoto, Prof.
Bioinformatics	Analysis of life information through applied soft computing	Makoto Kinouchi, Assoc. Prof.
Organic Chemistry for Life Science	Design and synthesis of organic compounds with the aim of analyzing biological phenomena, and development of pharmaceutical products	*Hiroyuki Konno, Assoc. Prof.

Biomimetic materials	Development of sensing materials to detect bioradicals that play significant roles in the human body, and applications thereof	Rikiya Sato, Assoc. Prof.
Surface Chemistry	Physical and chemical phenomena at soft interfaces	* Yoshimune Nonomura, Prof.
Synthetic organic chemistry	Development of new synthetic methods and reliable synthetic routes based on organometallic compounds. Optical resolution of chiral compounds using inclusion compounds	* Bunpei Hatano, Assoc. Prof.
Biomolecular functional engineering	Analysis of the functions of motility protein, which plays the central role in the motility systems of living creatures, and application thereof to nanotechnology	* Kuniyuki Hatori, Assoc. Prof.
Tissue engineering	Stem cells, tissue construction, and culture bioreactors for regenerative medicine and myocardial regeneration	* Zhonggang Feng, Assoc. Prof.
Systems control and fuzzy neural network	Adaptive control, robust control and hybrid system theory  General studies of high-frequency wireless communication engineering, theory of RF-CMOS IC design, and application of those state-of-the-art telecommunication technologies to biological information signal processing systems	* Eiichi Muramatsu, Assoc. Prof.  Michio Yokoyama, Assoc. Prof.
Biological measurement and image engineering	Development and application of optical sensing systems using high-performance image measurement technologies and computer applied technologies in the field of life science	* Yuuki Watanabe, Assoc. Prof.
Optical nanoscopy	Development of novel techniques in optical microscopy based on single molecule spectroscopy and super-resolution fluorescence microscopy, and their applications on biology and material science	* Jun-ichi Hotta, Assoc. Prof.
Protein Engineering	Protein design and engineering for development of useful novel proteins based on recombinant gene manipulation techniques.	* Koki Makabe, Assoc. Prof.
Biofunctional materials engineering	Studies on the mechanisms of human tissues, with the aim of designing and creating materials which can be used to replace or repair hard tissues, and evaluating those materials	* Takahiro Kawai, Assoc. Prof.
Organic functional materials chemistry	Design and synthesis of novel $\pi$ -conjugated molecules and their application in optical/electronic devices and chemo-/biosensors	* Hiroshi Katagiri, Assoc.Prof.
Applied microbiology	Application of microorganisms in food, medical, and environmental biotechnology	Shigekazu Yano, Assist.Prof.
Computational neuroscience and intelligent systems engineering	Studies on the modeling and simulation of brain, brain-style computation, machine learning, artificial and natural intelligence	Siu Kang, Assist.Prof.

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**[Electronics Engineering and Computer Science]**

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Static electricity, electricity and energy engineering	Analysis of phenomena in a high electric field including those of gas discharge, and application thereof to engineering operations such as mechanical processing and painting	Toshiyuki Sugimoto, Assoc. Prof.
	Phenomena of electrification and electric conduction of liquid and solid materials, with a focus on their electrohydrodynamics and electrostatic phenomena including electrostatic chuck and ionizers; and measurement thereof	*Kyoko Yatsuzuka, Assoc. Prof. ☆
Semiconductor materials and device engineering	Researches and developments on high-performance photovoltaic devices with atomically controlled film interfaces	*Fumihiko Hirose, Prof.
	Analysis of device surfaces using contact angle measurement and application to micro-bumps and MEMS, and use of ER (electrorheological) fluid for portable Braille systems	*Koichi Matsushita, Prof. ☆
	Theory, production, utilization and evaluation of solid-state sensors using electronic devices such as semiconductors and micro machines	Sumio Okuyama, Assoc. Prof.
	Studies on gas-solid surface reactions such as recombinative desorption from and abstraction at semiconductor surfaces, and developments on new semiconductor device based on surface science	Yuzuru Narita, Assist. Prof.
Magnetic materials and device engineering	Evaluation of the magnetic properties of magnetic thin films and magnetic microparticles under nanometer-order control, and the creation of such magnetic thin films and magnetic microparticles, and application thereof to the development of novel magnetic devices	*Nobuyuki Inaba, Prof.
	Physical properties of various magnetic materials, and control of the spin functions of magnetic materials	*Hiroaki Kato, Prof.
	Magnetic, electric and thermal properties of intermetallic compounds of transition metals or rare earth metals	*Yoshiya Adachi, Assoc. Prof.
Magnetic materials and device engineering	Magnetic properties and transport properties of the magnetic materials created through thin film processing as a nano-structure control method	*Kunihiko Koike, Assoc. Prof.
Functional electronic engineering	Generation of high-intensity ultrasound with the use of piezoelectric and magnetostrictive elements; and its industrial applications	*Kazunari Adachi, Prof.

Superconductive materials and device engineering	<p>Studies on the phenomena of superconductivity with the aim of developing electronic devices that can use an unexploited Tera-Hertz band, and superconducting materials that can be used for such electronic devices, and applications thereof</p> <p>Basic studies on superconductivity and application thereof to high-performance superconducting films and high-sensitivity Josephson coupling</p> <p>Terahertz-wave sensing using superconductive devices</p>	<p>* Kensuke Nakajima, Prof.</p> <p>* Atsushi Saito, Assoc. Prof.</p> <p>Hironobu Yamada, Assist. Prof.</p>
High-voltage plasma engineering	<p>Analysis and utilization of the electromagnetic phenomena and plasma phenomena that affect materials or organic cells at the time of the generation of a high-voltage, high-power ultra-short pulse or the impression of a high-voltage pulse</p>	* Yasushi Minamitani, Assoc. Prof.
Optical and quantum electronics and communication engineering	<p>Interaction between electrons and light in the low-dimensional fine structure of semiconductors such as quantum wells and fine wires, and application thereof to optical elements</p> <p>High-performance optical signal processing and optical communication systems using optical waveguides and optical integrated circuits designed by electromagnetic computing</p>	<p>* Yutaka Takahashi, Assoc. Prof.</p> <p>* Katsumi Takano, Assoc. Prof.</p>
Computers and telecommunication systems	<p>Protocol technologies for the Internet, local area networks, ad hoc networks and sensor networks, which is currently attracting considerable attention from researchers</p>	* Akio Koyama, Prof.
Mathematical and information Sciences	<p>Approximate solution methods for partial differential equations, including the finite element method, the boundary element method, the finite difference method, and the spectral collocation method; and their applications in engineering fields</p> <p>Analysis of pattern formation and the self-organization mechanisms of non-equilibrium systems; and studies on information dissemination in complex networks and structures thereof</p> <p>Studies on numerical methods for partial differential equations using meshless technique, and their applications in engineering fields</p>	<p>* Atsushi Kamitani, Prof.</p> <p>Atsushi Tanaka, Assoc. Prof.</p> <p>Ayumu Saitoh, Assoc. Prof.</p>
Computational complexity	<p>Design and analysis of computation and information processing on various computational models</p>	Kei Uchizawa, Assoc.Prof.
Probabilistic Information Processing	<p>Education and research on probabilistic modeling and analysis of information processing system and on application to the field of statistical data science</p>	Muneki Yasuda, Assoc.Prof.
Mathematical Physics	<p>Exactly solvable models associated with quantum groups and elliptic quantum groups</p>	* Takeo Kojima, Prof.
Instrumentation informatics and image engineering	<p>Inverse analysis method and computer applied technologies for the creation of high-performance sensing systems</p>	* Yasutaka Tamura, Prof. ☆

	<p>Remote measurement of network characteristics, visualization of invisible information, extreme measurement exploring theoretical possibilities, and development of instrumentation methods based on informatics</p> <p>Analysis of the perceptual information processing mechanism based on psychophysical methods, and relevant applied technologies for color science, lighting industries, image engineering, etc</p> <p>Computer algorithms to acquire desired information through time series signals or image data, and application thereof to medical data</p> <p>Studies of technologies and systems that use sound waves for non-destructive testing, and studies of commercialized signal processing technologies and image processing technologies</p> <p>Psychophysics on visual perception and recognition including object recognition and surface quality perception, and investigation of neural mechanisms underlying visual perception and recognition</p>	<p>* Yukio Hiranaka, Prof. ☆</p> <p>* Yasuki Yamauchi, Prof.</p> <p>* Tadanori Fukami, Assoc. Prof.</p> <p>Hiroataka Yanagida, Assoc. Prof.</p> <p>Takehiro Nagai, Assoc.Prof.</p>
Optical measurement and image processing engineering	Education and research on the advanced measurement engineering and its application using functional bio-sensing technologies with optical waves and image processing technologies	* Manabu Sato, Prof.
Audio and media information systems	Media signal processing including speech, audio (music), still images and video; coding, synthesis, recognition and processing of media signals for data transmission and storage, and its application to telecommunication systems	* Kazuhiro Kondo, Prof.
Mathematical brain science and recognition engineering	Component technologies for human-machine communication through spoken languages and their applications to engineering fields	* Tetsuo Kosaka, Prof.
Human interface	Human perception, recognition and affection in the course of their interaction with objects, environments or phenomena, and the resulting judgment, understanding and behaviors, and measurement and analysis thereof; and applications thereof in engineering fields	* Kohei Nomoto, Prof.
Intelligent informatics	Error correction ability evaluation of linguistic information which is applied to sequences of linguistic units that contain errors	Takashi Otsuki, Assoc. Prof.
Computational neuroscience and mathematical engineering	Research and education on the computational modeling of brain, analysis of nonlinear dynamical systems, and system optimization	* Shigeru Kubota, Assoc.Prof.
Computer engineering	Studies on integrated circuit design methods and memory systems to realize high-performance and low-power computer	Jubei Tdada, Assist. Prof.
Nanomaterial and energy device	Study of the morphology-dependent functional properties of semiconductor nanomaterials and their application in energy devices	Bashir Ahmmad Arima, Assoc.Prof

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**[Mechanical Systems Engineering]**

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Field	Contents of Education and Research	Instructors
Robotics and mechanical motion control engineering	<p>Materials evaluation for machine elements such as belts, evaluation of new materials including metals, composite materials and carbon materials; and fracture control design</p> <p>Telerobotics and virtual reality</p> <p>Mechanism and control of mobile robots, and applications thereof</p> <p>Design and performance evaluation of high-performance gears through the application of intelligent engineering</p> <p>Analysis of the kinetic properties of spatial link mechanisms, design of motion-transmissible mechanisms, and applications thereof</p> <p>The education and research on the creation of new functions of robots by applying ingenious mechanisms</p>	<p>* Hiroshi Iizuka, Prof.</p> <p>* Yuichi Tsumaki, Prof.</p> <p>* Kazuhisa Mitobe, Prof.</p> <p>Tatsuya Ohmachi, Assoc. Prof.</p> <p>Jun Nango, Assoc. Prof.</p> <p>Riichiro Tadakuma, Assoc. Prof.</p>
System control and fuzzy neural systems	Design of control systems such as distributed constant systems with time delay and nonlinear systems; and analysis of the kinetic and dynamic properties of muscular motion control systems	Takao Akiyama, Assoc. Prof.
Mechanics of materials and computational materials science	<p>Development and improvement of constitutive equations for inelastic materials subject to large deformation; applications of the constitutive equations to numerical simulations; and simulations of metal forming processes</p> <p>Development of computational methods for estimation and evaluation of crystal structures, micro-structures, mechanical properties, deformation behaviors, and the strength of materials</p> <p>Deformation behaviors at micro, mezzo and macro levels of solid-state materials, creation of micro-structures, and development of micro-sensor actuators</p> <p>Development of new process and numerical calculation for microstructure control and plastic deformation of Light materials</p>	<p>* Mitsutoshi Kuroda, Prof.</p> <p>* Takuya Uehara, Prof.</p> <p>* Go Murasawa, Assoc. Prof.</p> <p>Yuji Kume, Assoc. Prof.</p>



Advanced materials engineering	Creation of bio-compatible soft and wet materials with new functions, application of those materials to machines, optical characterization of structures and mechanisms of water-containing tissues in living organisms, and development of bio-inspired soft machines	*Hidemitsu Furukawa, Prof.
Oscillation & wave motions and tissue engineering	Analysis of oscillation phenomena and control/active control thereof, micro biosensor technologies, and mechanics of cells and tissues  Fluid flow noises; fluid-related oscillation; and oscillation and noises generated from diverse structures	*Tadashi Kosawada, Prof.  M.A. Langthjem, Assoc. Prof.
Environmental Conscious Design and Manufacturing	Development and design of new products that enables the integration of cost and quality factors together with environmental considerations	* Yasuo Kondo, Prof.
Thermal-fluid engineering and transport phenomena engineering	Studies on the heat transfer control of electroconducting and nonelectroconducting fluids by the magnetic force, the transient radiative transfer in a participating medium subjected to a pulse train, and the specific heat capacity measurement of solid  Development of flame synthesis technologies; analysis of reaction mechanisms in the combustion field; and energy conversion technologies  Analysis of thermal fluid phenomena and control of those phenomena; and micro-scale thermal fluid phenomena	*Masato Akamatsu, Prof.  Masaaki Okuyama, Assoc. Prof.  Ichiro Kano, Assoc. Prof.
Fluid systems engineering	Development of state-of-the-art intelligent fluid information processing technologies, with the aim of analyzing, from new angles, the phenomena of diverse complex flows including turbulent flows, separated flows, multiple-scale vortices, multiphase flows, biofluids, and flows around a motor vehicle, and applications thereof  Development of novel methodologies of computational fluid dynamics and applications thereof; mathematical simulation of materials transport; development of novel turbulence models; and development and application of ultrasound pumps  Basics and applications of the interaction between vortex and flow that causes turbulent flows, as well as the interaction between vortex and flame that causes turbulent combustion	*Akira Rinoshika, Prof.  Tameo Nakanishi, Assoc. Prof.  Masahisa Shinoda, Assoc. Prof.
Micro Nano Mechanical Engineering	Development of MEMS (Micro Electro Mechanical Systems) sensors, actuators, micro/nano robotics, and micro/nano fabrication process technologies  Micro-/nanostructured photonics for ultra-high sensitive devices and optical manipulation Nanofabrication based on laser materials processing and lithography	*Takashi Mineta, Prof.  Hiroaki Nishiyama, Assoc. Prof.
Smart Microstructure Engineering	Basics and applications of microstructures such as microbubbles, microcapsules, and micro/nanoparticles	*Toshinori Makuta, Assoc. Prof.
Advanced materials engineering	Function-structure design, processing and applications of advanced organic materials	Jin Gong Assist. Prof

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**[Business administration of manufacturing technologies]**

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Field	Contents of Education and Research	Instructors
High Speed and High Frequency Electronics	Development of generic technologies for ultra fast communication and information processing and trend review in advanced information society	* Kensuke Nakajima, Prof.
Management of value creation	Management of the value creation for technologies and regional resources to cope with various changes in market, policy, customer intention and industrial structure  Basic viewpoints in establishing the criteria for materials selection which is important to manufactures; and evaluation of the mechanical properties, such as strength and durability, of novel materials  Education and research on viewpoint required for utilizing technologies, especially chemical technologies	* Hiroyuki Noda, Assoc. Prof.  * Hiroshi Iizuka, Prof. ☆  * Bungo Ochiai, Prof.
Innovation Management	Research and education of innovation management which is to create a new market and large positive value to society by introducing completely new products, services, or business management processes	* Yoichiro Tanaka, Prof.
Computing, Big Data and Internet of Things (IoT)	Research and education of advanced computing platform and the architecture for analyzing big data and IoT applications such as data centeric medical science analytics	* Yoichiro Tanaka, Prof.
Business Management	Education and research in management accounting, continuous improvement, and development of organizational capability	Shino Hiiragi, Assoc. Prof.
Regional Innovation	Education and research on the creation of a framework for regional innovation that contributes to the creation of regional value, development of effective methods, and evaluation	Yumi Takasawa, Assist. Prof