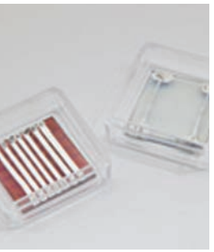
Education Program of Materials and Bioscience Domain of Materials and Bioscience

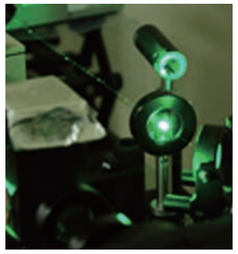
Department of Chemistry and Chemical Biology

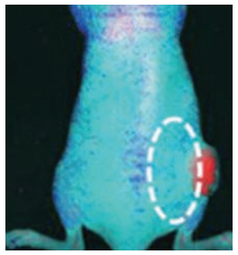


Materials and Bioscience

In order to confront the complicated problems that contemporary society faces, the integration of science and technology in harmony with a broad range of fields has become increasingly important. The disciplines of chemistry and biology have contributed in this endeavor and it is certain that synergy between these branches of science will produce further breakthroughs by combining their common perspectives of “molecular transformation” and “functional organization of interactions.”

To promote these developments, a new department was established in 2007 that fused chemistry and chemical biology, which has grown into the Division of Molecular Science. We are home to more than 30 research groups in major research areas of Molecular Science, Material Science and Chemical Biology. Each research group pursues its own research mission as well as collaborating on joint research projects with other groups.





New functional bio-based plastics and clarifying the biodegradation mechanism of plastics

Ken-ichi Kasuya leads the Green Polymer research group at Gunma University. Research in his group focuses on the development of new functional bio-based plastics and clarifying the biodegradation mechanism of plastics. Recently his group has succeeded in synthesizing a fully bio-based plastic from a plant. In addition, he has been addressing the development of novel biodegradable plastics in order to solve profound problems caused by microplastics in the ocean.

Professor Ken-ichi Kasuya

Toward understanding the biological function of carbohydrate through chemical synthesis

The main research focus in Professor Matsuo's laboratory is carbohydrate chemistry. Carbohydrates play various biological roles such as cell-cell recognition, differentiation, malignant transformation, bacterial infection, and glycoprotein quality control. Our research group is working on synthesis of glycoconjugates (e.g. N-linked and O-linked glycoprotein glycans, glycolipids, and glycosylated natural products) and chemically modified glycans, with the aim of clarifying the biological roles of carbohydrates, developing diagnosis systems for carbohydrate-related disorders, performing functional analysis of glycosyltransferases/ glycosidases, and developing glycosylated new materials.

Professor Ichiro Matsuo

Faculty Members and Fields of Specialization ▶▶▶

	Faculty Members	Fields of Specialization
Professors	Motoko S. Asano	Photophysics and design of photofunctional composite molecular systems including coordination compounds
	Hideki Amii	Development of synthetic organic reactions and their applications
	Keiji Ueno	Syntheses, structures, and reactivities of organo- and inorganometallic complexes
	Hiroki Uehara	Development of property and functionality of nano-structured polymeric materials
	Masafumi Unno	Organosilicon and organic heteroatom chemistry: molecular design, synthesis, and application
	Kenji Oosawa	Structural and functional analyses of bacterial flagella and chemotaxis receptors, and genome informatics
	Tetsuo Okutsu	Physical chemistry, photochemistry and crystal growth
	Hiroaki Ozaki	Development of modified nucleic acids and its application
	Ken-ichi Kasuya	Structure and function of polyester-degrading enzymes, screening of microorganisms involved in the environmental cleanup
	Soichiro Kyushin	Structures and properties of organosilicon compounds
	Toru Kyomen	Solid state chemistry and design of functional oxides
	Takako Kudo	Molecular orbital study of silicon or transition metal compounds
	Kazuo Shinozuka *	Chemistry of functional oligonucleotides such as antisense DNA, nonradioisotope labeled oligonucleotide probes, and the artificial nuclease system
	Soshi Shiraishi	Development of carbon-based nanoporous materials and electrochemical capacitors
	Yoshihiro Sumiyoshi	Studies on molecular structures of transient species and complexes consisting of radic
	Masashi Sonoyama	Biomolecular science, Biophysical chemistry of proteins, Biospectroscopy, Bioinformatics
	Hiroshi Takahashi	Structural analysis and thermal study of model biomembranes
	Shigeki Takeda	Functional analysis of receptors, characterization and application of protein self-assembly
	Kin-ichi Tsunoda *	Opto-chemical sensors, liquid chromatography of metal chelates and atomic spectrometry
	Toshiaki Dobashi	Phase equilibrium of multicomponent solutions, structure of microcapsules and physical chemistry of biological materials
	Seiji Tobita	Photochemical and photophysical processes of aromatic compounds
	Yosuke Nakamura	Construction and properties of novel π-conjugated systems including fullerene chemistry and supramolecular chemistry
	Minoru Hanaya	Development and characterization of functional solid-state materials
	Mitsuhiro Hirai	Study of nano-structure, dynamics and functions of proteins/membrane signaling systems using neutrons and synchrotron X-ray
	Ichiro Matsuo	Glycoscience, Glycotechnology, Synthetic study of glycoconjugates
	Takeshi Yamanobe	Structure of polymers and solid state NMR
	Takao Yamamoto	Statistical physics
	Kaori Wakamatsu	Structural biology of proteins involved in signal transduction, prevention of protein aggregation, and development of epileptic rat
Associate Professors	Naoki Asakawa	Bio-inspired devices using emergent property found in polymers
	Yusuke Inoue	Functional analysis of the liver-enriched nuclear receptors using gene-targeted mice
	Shinji Iwamoto	Solvothermal synthesis of inorganic materials and their performance as catalysts
	Atsushi Enomoto	Suppression of antibody and T cell responses against allergens and autoantigens, advanced functional foods for prevention of diseases
	Md. Zakir Hossain	Chemical modification of epitaxial graphene on SiC substrate
	Hiroyuki Oku	Malaria vaccine and diagnosis material; biofunctional chemistry; biomedical and functional polymers
	Ken-ichiro Kanno	Synthesis and properties of novel organosilicon compounds using transition-metal complexes
	Masayasu Kuwahara	Creations of new nanobiomaterials based on functionalized nucleic acids
	Kiichi Sato	Development of micro bioanalysis systems
	Hiroshi Sano	Exploration of new synthetic methods based on organometallic chemistry, particularly for asymmetric synthesis and natural product synthesis
	Tsuyoshi Takahashi	Construction and application of functional molecules using peptide and protein engineering
	Nobuhiro Takeda	Synthesis of metal complexes bearing new ligands for the purpose of activating small molecules
	Hiroyuki Takeno	Self-assembling structure and dynamics of multicomponent polymer systems
	Yoshiharu Toyama	Blood rheology, blood coagulation, and effects of high pressure on living organisms and biomaterials
	Nobukazu Nameki	Analyses of novel translation regulation mechanisms, and structural bioinformatics
	Jun-ichi Fujisawa	Studies of organic-inorganic hybrid materials for light energy conversions
	Hiroaki Horiuchi	Study of photofunctional materials based on photo-physical chemistry
	Takako Muraoka	Studies on unique ligands with heavier typical elements and their transition metal complexes
	Tomohisa Moriguchi	Development of functional oligonucleotides, chemistry of natural products
	Minoru Yamaji	Photophysics and photochemistry of organic and organometallic compounds
	Keiichi Yamada	Development of novel bioactive peptides utilizing molecular imaging technique
	Toshitada Yoshihara	Photophysical and photochemical studies of aromatic compounds and its application for bioimaging
	Masaru Yoneyama	Transition metal-catalyzed polymerization, polymerization in specific environments, and synthesis of polymers with specific structures
Visiting Professors	Hideki Abe	Studies on molecular and material design of polymers from biomass organic chemicals
	Masayuki Ikeno	Development of silicone elastomers
	Maki Ito	Synthesis and structure analysis of silsesquioxanes
	Takahumi Imai	Polyorganosiloxanes: preparation, characteristics and industrial applications
	Takayuki Kawashima	Creation of new functional molecules utilizing main group elements
	Takeshi Saito	Preparation and evaluation of organic standard reference materials
	Toshiyuki Suzawa	Process development of biopharmaceuticals
	Noriaki Seko	R&D of the polymer modification technique by radiation processing
	Mitumasa Taguchi	Reactions of radiation-induced reactive species and their applications in water environment conservation
	Masahiko Numata	Preparation and evaluation of organic standard reference materials
	Yasunari Maekawa	Synthesis of thermally stable polymeric functional materials
	Atsushi Miwa	Research of the activity enhancement and DDS of oligonucleotide drug
	Tetsuya Yamaki	Nanotechnology Research and Material Development for Applications to Next-Generation Energy Devices
Visiting Associate Professors	Masaki Sugimoto	Synthesis of functional SiC ceramics from Si-based precursor polymers
	Ryoji Tanaka	Exploration of new synthesis methods in organosilicon chemistry
	Eiichi Tabei	Decomposition mechanisms of organosilicon compounds
	Naoko Nonose	Chemical standards for inorganic materials and plasma spectrometry
	Keiji Numata	Studies on structure-function relationship of spider dragline silk and artificial silk materials
	Akihiro Hiroki	Radiation modification technologies for environment-friendly polymer materials
	Shigehiro Yanagihara	Development of test method and quality control of biopharmaceuticals

* will retire in March, 2019

Students Voice

Graduate Student / Chowdhury Jakir Ahmed

Professor Shinozuka’s Laboratory, Gunma University Faculty of Engineering

At Professor Shinozuka’s Laboratory, I was plunged straight into advanced research in oligonucleotide chemistry. I am thoroughly enjoying my time here at the university and have come to love not only the university, but also the local people here in Gunma. The local environment here is also extremely beautiful.