

Organic Materials Science

Course title	Course description	Instructor
有機光機能材料化学特論 A Chemistry of Organic Photofunctional Materials A	This course teaches photofunctions of organic and polymeric materials. Especially, designs and syntheses of the materials for linear and nonlinear optics and their properties and applications will be described in detail.	岡田 修司 Shuji OKADA
高分子特性解析学特論 Advanced Macromolecular Characterization	Properties of macromolecules strongly depend on their shape (conformational properties). Therefore, it is very important and essential to know macromolecular characterization techniques under a molecular level. Solution properties, heterogeneities, determination of average molecular weight, statistical, hydrodynamic, and thermodynamic properties of macromolecular solution are delivered in the lecture.	川口 正剛 Seigou KAWAGUCHI
精密重合反応特論 Precise Polymerization Reactions	The lecture focuses on synthetic aspect in polymer chemistry, particularly synthetic methods to produce functional polymers with well-defined primary structures. Basic theory of controlled/living polymerizations to regulate the molecular weights and polydispersity, characteristics of representative polymerization methods, and analytical tools to evaluate the resulting polymers are explained with actual examples. Some new topics, such as branched polymers, hybrid materials, highly-ordered nanostructures will also be introduced.	森 秀晴 Hideharu MORI
有機反応化学特論 Advanced Organic Reactions	This course deals with reactions of organic compounds. Especially, reaction mechanisms, and stereo- and regioselectivity in the reaction will be lectured after explanation about chemical bonding, chemical structure, and stereo chemistry of organic compounds.	羽場 修 Osamu HABA
有機金属化学特論 Advanced Organometallic Chemistry	Organometallic chemistry is based on organic and inorganic(coordination) chemistry. We study (1) preparation and characters of organometallic compounds, (2) organometallic compounds-catalyzed organic reactions such as Suzuki-Miyaura coupling reaction, and (3)transition metal-catalyzed polymerization reactions such as ROMP.	前山 勝也 Katsuya MAEYAMA

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高分子電子材料合成特論 A Synthesis of Polymeric Electronics Materials A	The controlled synthesis of π -conjugated polymers with predicted average molecular weights, molecular weight distributions, and regioregularity based on intramolecular catalyst transfer systems will be lectured. The design, synthesis, and purification of π -conjugated polymers as well as the relationship between their primary structures and optoelectronic performances will also be discussed in detail.	東原知哉 Tomoya HIGASHIHARA
有機材料構造化学特論 A Advanced Structural Organic Chemistry of Materials A	This course teaches the nature and properties of intermolecular forces (IMFs), which plays an important role for self-assembly in life science and materials science.	片桐洋史 (理工学研究科) Hiroshi KATAGIRI
有機半導体材料特論 Organic Semiconducting Materials	This course deals with optoelectronic organic materials, design and synthesis of polymeric materials, and mechanisms to achieve the functions. In particular, design, synthesis, and fabrication of materials used for organic light emitting devices will be discussed in detail.	城戸淳二 Junji KIDO
有機薄膜物性特論 A Physical Properties of Organic Thin Films A	This course teaches (1) the fabrication methods, (2) molecular packing, orientation and crystallinity, and (3) optical and electronic properties of the thin films composed of π -conjugated small molecular or polymeric materials.	時任静士 Shizuo TOKITO
有機材料物性物理学特論 Physical Properties of Organic Materials	The fundamental view and understanding about the effect of chemical structure on mechanical and physical property is explained by using engineering plastics as examples, which can be applied research and development. The practical training to gather patent information search related with each research topics is also included.	高橋辰宏 Tatsuhiro TAKAHASHI

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有機半導体物性特論 Semiconductor Physics of Organic Materials	This course teaches the fundamental physics of electronic states and electronic properties of organic semiconductors, which are important in understanding and designing organic electronic devices. Starting from the band theory of inorganic semiconductors, theories of carrier transport and carrier injection in organic semiconductors are introduced. The operation of organic semiconductor devices is explained by the basic theories.	松井 弘之 Hiroyuki MATSUI
有機電子材料合成特論 A Synthesis of Organic Electronics Materials A	Organic electronics is literally the field on the electronics devices with organic materials. In the development of the organic electronics devices, the development of new organic materials is the essence. This lecture introduces synthesis, purification, and characterization of the materials for organic light emitting diode, organic transistors, and organic photovoltaics etc.	笹部 久宏 Hisahiro SASABE
光エレクトロニクス特論 Advanced Optoelectronics	This course systematically lectures the fundamental theory of wave optics for understanding technologies of organic optoelectronics. In particular, optical constants of organic solids and optical interference in thin films are mainly discussed to understand optical phenomena in optical devices with a multilayer structure.	横山 大輔 Daisuke YOKOYAMA
電気化学特論 Advanced Electrochemistry	Basic theories of electrochemistry, methods and principles of electrochemical analysis as well as practical applications in electrochemical processing and devices are lectured. Special focus will be given in batteries, clean energy devices such as fuel cells and solar cells. The latest trend in research will be given and the future direction will be scoped.	吉田 司 (理工学研究科) Tsukasa YOSHIDA

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ナノ材料工学特論 Engineering for Advanced Nanomaterials	<p>Nanotechnologies of organic and inorganic materials are integrated and comprehensive science and technology field covering the wide range fields such as materials, environment, and energy.</p> <p>In this lecture, we focus on nanoparticles such as fabrication and size control method, and their properties due to dimensional control of these particles. Finally, the application based on particles will be discussed.</p>	増原 陽人 (理工学研究科) Akito MASUHARA
高分子成形加工学特論 Advanced Polymer Processing	<p>This lecture reviews a various properties of polymeric materials, process-ability, and molding process technologies. This lecture also introduces a various physical properties and higher order structures of molded products.</p>	伊藤 浩志 Hiroshi ITO
高分子構造学特論 A Polymer Nanostructures A	<p>Recent progress of scanning probe microscopy enables us to observe polymer structures at the molecular level. This course reviews present achievements of the observations, which include isolated chains, crystals, blends, supramolecules, and some dynamic observations of these structures. Force curves of single polymer chains are also reviewed.</p>	熊木 治郎 Jiro KUMAKI
材料強度学特論 Failure Analysis in Materials	<p>This course lectures the mechanical properties of polymers and their composite on the basis of elasticity, plasticity and fracture mechanics. Topics are focused on the mechanical behavior under impact and/or high strain rate, and explain the relationship between properties and microstructures of advanced polymeric materials.</p>	栗山 卓 Takashi KURIAYMA
高分子レオロジー特論 Polymer Rheology	<p>After a brief review of elementary rheology, a simple discussion of random walk and diffusion will be presented as a basis of polymer dynamics. Then the three important models of polymer rheology, i.e., (1) the simplest Rouse model, (2) the Zimm model for dilute solutions, and (3) the tube model for entangled polymers, will be explained intuitively without going into the mathematical details. Some of the recent progress and unsolved problems in polymer rheology will also be discussed.</p>	瀧本 淳一 Jun-ichi TAKIMOTO

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機能性高分子物性工学特論 Advanced Properties of Functional Polymers	After reviewing the fundamental matters on properties of polymer materials, the correlation between physical properties and processability are lectured by taking actual materials as an example. The technical paper as text will be used to understand the physical properties of polymer materials. After reading this technical paper on the properties of the functional materials, the contents of this paper will be discussed.	西岡 昭博 Akihiro NISHIOKA
有機分子モデリング特論 Modeling of Organic Molecules	In this lecture, we discuss way to describe structures and properties of materials composed of organic molecules by using numerical technique. Examples of modeling of molecules and results based on the models are introduced. After performing numerical simulations for systems of simple model molecules, we finally examine molecular simulation for a system of original model molecules.	香田 智則 Tomonori KODA
高分子応用レオロジー特論 A Applied Polymer Rheology A	This course lectures applied rheology of the polymer melts and concentrated solutions, which includes not only linear viscoelastic envelope, but also non-linear regime under shear and elongational flows. This course provides the information necessary to build an understanding of various polymer processings such as film casting, film multi-stratifying, blow molding, foaming and so on.	杉本 昌隆 Masataka SUGIMOTO
有機材料物性物理学 A Physical Properties of Organic Materials A	This course lectures higher ordered structure and structural formation processes of multi-components polymers and complexed organic device materials. Especially, the morphology and molecular dynamics of organic materials were introduced.	松葉 豪 Go MATSUBA
高分子液体・固体物性特論 Properties of Polymeric Liquids and Solids		Sukumaran, Sathish Kumar

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界面科学特論 Surface and Interfacial Science	Whereas band structures determine electronic properties of silicon-based devices, it is interfacial structures that influence carrier densities and energy dispersions of organic -based devices. The lectures focus on fundamentals and experimental methods of interfaces between various kinds of materials (organic, inorganic, polymer, metal, etc.) and phases (solid, liquid, gas, etc.).	佐野正人 Masahito SANO
有機半導体デバイス特論 Organic and Inorganic Semiconductor Devices		廣瀬文彦 (理工学研究科) Fumihiko HIROSE
材料物性学特論 Materials Physics and Chemistry	Learn the relationship between structure and mechanical properties of various industrial materials. Understand concepts that are important in considering manufacturing process and application in real environments. Learn the necessary engineering concepts for use in automobiles, robots, medical equipment, etc.	古川英光 (理工学研究科) Hidemitsu Furukawa
視覚情報システム概論 Visual Perception		山内泰樹 (理工学研究科) Yasuki YAMAUCHI
量子エレクトロニクス特論 Advanced Quantum Electronics	This course lectures dynamics of electron, crystal structure, Maxwell equations and electromagnetic wave, and so on. These topics are important to understand semiconductor devices and optical devices.	奥山澄雄 (理工学研究科) Sumio OKUYAMA
先端情報通信 L S I システム特論 A Advanced Semiconductor System for ICT A	This course lectures GHz-band wireless communication system design for ubiquitous network application. Radio-frequency design methodology of the devices and materials for compact, high-functional components are introduced. Some new technologies expected for advanced wireless system will also be introduced with a comparison between organic and silicon electronic devices.	横山道央 (理工学研究科) Michio YOKOYAMA

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生体機能材料特論 Advanced Bioconjugated Functional Materials	This course lectures fundamental knowledge about variety, structure, and function of biomolecules and biopolymers. Also, the creation of biomolecule-conjugated functional materials and the advanced utilization of biopolymers as inexhaustive resources are lectured.	鳴海 敦 Atsushi NARUMI
生体機能分子化学特論 Chemistry of Biofunctional Molecules	This course lectures application, chemistry, and design of biofunctional materials. The materials covered include active oxygen species, biomaterials, artificial organs, and so on. Fundamentals for artificial organs and regenerative medicine will also be introduced.	佐藤 力哉 (理工学研究科) Rikiya SATO
食品応用学特論 Applied Food Science		非常勤講師
有機材料システム特論 Advanced Organic Materials Science		非常勤講師
理工系のための実用英語 I English for Engineering and Science I		多田隈理一郎 (理工学研究科) Riichiro TADAKUMA
理工系のための実用英語 II English for Engineering and Science II	The focus of this course will be on those aspects of English that are likely to be of most use in engineering and scientific contexts. We will use both scientific and non-scientific articles to improve your understanding of what you read and to learn how to summarize and review an article. The overall aim of this course is to enable the students to communicate more effectively in English.	Sukumaran, Sathish Kumar

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キャリアデザインセミナー Career Designing Seminar	<p>The purpose of this seminar is for the students to clarify the careers that they want and make their efforts at the university graduate schools effective. Students will envision their career paths after completion of the graduate program, and will assess the competency, knowledge, technology, and expertise necessary to realize them. Next, they will draw up two-year or five-year study plans and learning plans. These plans will not be limited exclusively to subjects studied in the graduate school, but will also include activities and research in Japan and abroad. Based on such plans, students will acquire a clear grasp of the scholarly knowledge and technologies they should possess after completion of the graduate program and the competency they should develop, and will design their careers in concrete terms.</p>	神戸 士郎 (理工学研究科) 他 Shiro KAMBE and others.
価値創成プロジェクト Innovative Systems Co-creation Project	<p>It is a lecture to cultivate the research power and creativity necessary to challenge the creation of new fields assuming that they will be active in the field where value creation is required. Specifically, we aim to acquire the ability to promote and publish research through project management and presentation exercises.</p>	古川 英光 (理工学研究科) 他 Hidemitsu FURUKAWA and others.

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実践型 P B L 教育 I Project-Based Learning I	<p>After completion of their post-graduate education, students are expected to engage in activities utilizing their specialized knowledge on a global scale at universities or companies. In this practical course, students will develop basic skills as members of society by seeing projects to the end, and proactively engaging in problem-solving tasks. The course will also aim to foster students' abilities to provide solutions with awareness of the issues at hand, team management competency, and communication skills. By engaging in actual projects, students will acquire understanding of the gap between theory and practice and the obstacles that exist in each project, ability to overcome them, and high professional awareness, as well as a sense of self-reliance and responsibility. Furthermore, the course aims to foster students' independency (autonomy) as engineers and researchers, and also to improve their professional awareness and career outlook through actual work experience.</p>	専攻教員 他
グローバルコミュニケーション演習 I Exercise for Global Communication I	<p>For success of researches in worldwide, students need to get abilities of hearing, talking in academic meetings and symposium with English and the way to make attractive presentation. Through taking part in attendance/presentation/discussion of international symposium, global communication skills were got. In 1st year grade, students participate the international symposium.</p>	松葉 豪 非常勤講師 他 Go MATSUBA and others.
フレックス大学院シンポジウム / セミナー International Symposia / Seminars	<p>Students cooperate to plan and hold international symposiums and international seminars. By students planning, planning and managing the symposiums and the seminars, students acquire management skills. In addition, we will make international network among young researchers. This work strengthens presentation skills and English ability through participation, presentation and discussion at the symposiums and the seminars.</p>	松葉 豪 古川 英光 (理工学研究科) Go MATSUBA, Hidemitsu FURUKAWA

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マイポータルサイト My Portal Website	It is a work that utilizes a predetermined website as a "student portal site" and sends student activities as content and CV of each person, leading to international exchange and network formation, leading to a global leader. Contents related to overseas training and internship in the next 1 to 2 years, contents relating to academic presentations and papers presentation for 3-5 years, and CV of each person etc are created. Learn how to provide information for the global through making English contents.	古川 英光 (理工学研究科) 他 Hidemitsu FURUKAWA and others.