Division of Frontier Engineering	Research field	Environmental and Energy Engineering	Lab. ID FE14
Laboratory web site			

Research subjects

Environment and energy are closely related to each other. Our laboratory conducts researches aimed at solving various environmental and energy problems based on materials engineering, chemical process engineering, and bioengineering. Specifically, we are developing thermally driven chemical and adsorption heat pump/chiller systems that use natural refrigerants such as water and lower alcohols, preparing high functional materials to be incorporated in these systems, and developing composite materials that utilize effectively low-temperature waste heat and solar heat by using chemical reactions. We are developing advanced technologies and processes for aluminum surface modification. We are also creating solid absorption materials with a higher thermal conductivity for the efficient separation and recovery of carbon dioxide from the air. At the same time, we focus on the elucidation of the impact of wastes on the environment, their evaluation methods, and the development of technologies for efficient recycling of wastes as a resource. In particular, we study the degradation mechanisms and evaluation methods of waste plastics in water, the evaluation of the effects of soil burial on microbial flora, and technologies for recovering and reusing valuable resources such as phosphorus from waste materials. We also engage to develop efficient production and separation technologies for pharmaceutical-related components using energy- and resource-saving bioprocesses.

Master/Doctor course: Education policy, curriculum, typical activity in the laboratory

Graduate students in the master's and doctoral programs are responsible for their own individual research subjects. Additionally graduate students provide support to fourth-year undergraduate students who are in charge of subjects related to their own research, and in particular, doctoral students provide more specific guidance and supervision. Students in the lab join the research group of the primary supervisor, participate in each group and laboratory-wide seminars, and regularly report on their research and introduce the related literatures. They also discuss the progress of their research and implementation plans with their supervisors on a weekly basis. We encourage students to present their research at domestic and international conferences, and graduate students are expected to present their research outcomes at least once a year. Furthermore, when sufficient research results are obtained, we submit papers to international academic journals.

Daily life in the laboratory, etc.

In our laboratory, we value the independence of our students and strive to create an environment in which they can concentrate on their research under the minimum necessary rules. We do not conduct experiments in the nights except when it is unavoidable, and students proceed with their research according to their own plans. There are also drinking parties and other events to promote close communication among students and between students and faculty members.

Message or comments by the laboratory faculty staffs

Our laboratory is engaged in research subjects related to the "environment" and "energy" for social implementation based on an understanding of basic science. We hope that our students will experience the joy of taking on new challenges and achieving steady but successful results. While valuing the free atmosphere of the laboratory, we strive to create an environment where students can grow through friendly competition with each other. We strongly promote the acceptance of international students and the students' admission to graduate school (master's and doctoral programs). Our goal is to develop human resources who support Japan's manufacturing in the next generation and who can also play an active role in the world.

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