

Division of Frontier Engineering	Research field	Chemical and Mechanical Process Engineering	Lab. ID FE19
Laboratory web site	https://takilab.com		
Research subjects			
In the Chemical Mechanical Process Engineering Laboratory, we are studying the mechanical processes used to manufacture plastic and other chemical products around us. For example, we are studying industrial machines for manufacturing ocean-degradable plastics, which are an innovative solution to the problem of marine plastic waste; machines for manufacturing plastic foams, which are attracting attention as an energy-saving and lightweight material; 3D printers using UV-curing resin; machines for manufacturing films with wrinkles on the order of 100 nm which dramatically improve the battery life of smartphones; and sensing technology for twin-screw extruders for manufacturing plastics. We are also conducting research and development on sensing technology for twin-screw extruders used in plastic production, and alternative meat made from soybeans. We are also developing structural analysis and simulation technology using large-scale synchrotron radiation facilities (SPring-8, etc.), and are working with industry (private companies) to conduct research that mixes science and engineering.			
Master/Doctor course: Education policy, curriculum, typical activity in the laboratory			
Since the research institution is short for undergraduate students, they basically follow a research plan under the direct guidance of Professor Taki. Students in the Master's Course (Master's) often decide on the direction of their research by thinking for themselves. This is in order to tackle unresolved research issues that even Professor Taki does not yet understand as research themes. Through experiments, students strive to understand their research subjects through trial and error. In the doctoral course (doctoral program), students set their own research topics in consultation with Professor Taki, conduct experiments with their own hands, summarize the experimental results, and present the results in a paper, repeating the process three times. By presenting the results in a paper, students acquire the minimum skills required to be a professional researcher.			
Daily life in the laboratory, etc.			
Our core time in the lab is from around 9:00 am to 5:00 pm. During the hours when Professor Taki is in the lab, we have meetings and carry out our research. Each student has a debriefing session once every two weeks to report on the progress of their research. It is usually held every Friday morning at 10:00. Students learn the skills to put their research into tasks, conduct experiments in a systematic way, and report on a regular basis. about 20 times in a year, so they naturally acquire data analysis, presentation, and writing skills. In the debriefing session, students read out their reports in front of everyone, receive comments from Professor Taki, and decide what they will carry out by the next time to carry out their research.			
Message or comments by the laboratory faculty staffs			
Chemical-mechanical-process engineering will achieve several innovations in materials and manufacturing processes (material-process innovation) by combining knowledge of chemistry with machine technology. Chemistry may seem like a rote subject, or something to do with turtles in benzene rings, and mechanical engineering students may not be familiar with chemistry. However, chemistry can transform low value raw materials into high value products through reactions. By developing large-scale machines that cannot be used in test tubes or flasks, we can perform chemical reactions that could not be done before and create new substances. There are many opportunities for mechanical engineers to play an active role in the field of chemistry. Please come to my laboratory and let's create innovation in chemistry and machinery.			
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