

Faculty of Engineering Highlight

2013-14
Highlights

Yokohama National University
Faculty of Engineering

<http://gakufu.eng.ynu.ac.jp/english/index.html>
<http://kenkyuin.eng.ynu.ac.jp/english>

Dean's Message —from Fiscal Year 2013 to 2014

Atsuo KAWAMURA

Dean, College of Engineering Science,
Dean, Graduate School of Engineering



I will summarize the activities of the Graduate School of Engineering and also College of Engineering Science from fiscal 2013 through the beginning of fiscal 2014.

When I took over as dean in April 2014, my manifesto was the realization of a more vital Graduate School of Engineering; aiming for a “graduate engineering school at a research university,” while honoring the existing plans for reform, I pursued the following four concrete goals. Goal (1): Design of an attractive future image of the Graduate School of Engineering; Goal (2): Under the discipline of “tekizai-tekisho”, each professor should put more emphasis on his or her main activities among four categories: education, research, public contributions, and administration; Goal (3): More globalized education and research, and Goal (4): Listening to public opinion.

From April 2013 on, I was caught up in the mission–redefinition activities conducted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), which concluded in June 2013. The essence of the conclusion thereof was that the Graduate School of Engineering at YNU is ranked in the top class educationally because of its many Ph.D graduates; however, its research activities are ranked among the second group, mainly due to modest external funds and fewer citations of published papers from YNU. This means that if we still aim at YNU

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being a research university, we need to make more efforts to enhance research activities in the Graduate School of Engineering.

In this context, I tried to activate research activities through, in particular, increasing the external funds obtained from “Kakenhi” (Grants-in-Aid for Scientific Research). We organized “Kakenhi” groups to discuss and polish ideas for new grant proposals. Elsewhere, we increased the payback amount for indirect costs from the previous year. At the same time, while recommending approaches to grants more difficult to obtain, we increased the insurance for proposals not adopted, securing incentives. The monetary incentives for interdisciplinary projects, group projects, and research forums in the Graduate School of Engineering was re-designed and additional research time for each professor was planned for. As a result, the number of proposals submitted in November increased, including new plans and those in the tougher grant categories.

Elsewhere, from May 2013 on I collected many specific ideas on how our Graduate School might become more active in each field. As a result, more than one hundred proposals were sent to me, and I categorized them into fields for consideration including undergraduate education, graduate education, research, administration, evaluation management and others. This led to the resolution of numerous inconveniences. For example, the same-day issue of campus parking permits, re-consideration of travel expense breakdowns, incentive re-consideration in terms of monetary return to researchers, bonuses reflecting indirect funding, the strong necessity of increasingly globalized education, a unified management system for research achievements, self-declaration of effort management and so on. Most of these were resolved. For example, in June 2014 the YNU president presented rewards to researchers receiving substantial external funds.

In December 2013, the Dean’s strategic funding was distributed to (1) intensive projects in EP’s in the College of Engineering Science or specialization divisions in the Graduate School of Engineering, (2) support for English lecturing, and (3) support for supervision of more doctoral students. Also, Dean’s lunch meetings were held with approximately 60 young and recently hired faculty members. One remaining promise is Goal (1) Design of an attractive future image of the Graduate School of Engineering. This will be taken under discussion during this year.

Since April 2014, I have initiated (1) an international distinguished lecture series, (2) an international planning committee aimed at more globalized education, and so on. I am always aiming for an open Dean’s office, and looking forward to your visit whenever you have opinions on the Graduate School of Engineering.

Highlight of Education

Aiming to Pursue the Depth of Science and Engineering Education

Ken-ichi Kawai, Chief Administrator, Education Planning Management Committee

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) announced the results of the redefinition of the mission related to the engineering field on December 18, 2013. The goal is to reinforce the functions of universities by organizing and developing the strengths, characteristics and social roles of each university to have them take more active social roles. The field of engineering of Yokohama National University declared that its social role is, based on its accumulated tradition and activities, “to develop human resources that can achieve innovation and contribute to enhancing industrial competitiveness in science and technology” and “to make continuous improvement and enhancement of undergraduate and graduate educational programs that develop global human resources in science and technology by promoting education reform based on international standard, such as the conversion of the language of all lectures into English in the graduate school.”

In April 2011, the College of Engineering Science was established to form an educational organization that systematizes a wide range of fundamental education covering from science to engineering aiming to foster scientists who have engineering sense as well as engineers and engineering researchers who have science sense. Besides a Bachelor of Engineering, College of Engineering Science newly started offering a Bachelor of Science. The class of 2011 admitted will graduate in March 2015.

The Graduate School of Engineering will start to convert the language of all lectures in the graduate school into English in April 2015 to develop “global human resources in science and technology” in order to respond the request from industries. Graduate students are also recommended to take up international internships at overseas enterprises, institutions and universities to develop the talents who can achieve substantial accomplishments across international borders. In addition, overseas students are welcomed to be admitted to the graduate school from developed and developing countries.

For the conversion of the language of all lectures in the graduate school into English, it is necessary for students to brush up their English ability. To support them, we are also planning to offer the environment that students can improve their English in the ES Tower. Two study rooms are provided on the second floor of the ES Tower. Students can receive many kinds of English educational materials through digital signage systems.

The Graduate School of Engineering, Yokohama National University and Changwon National University, Korea, agreed on the joint implementation of Double-Degree Program to develop global human resources in science and technology. Prof. Atsuo Kawamura, Dean of Graduate School of Engineering, attended a signing ceremony of the Agreement on the Joint Implementation of Double-Degree at the partner university on June 4, 2014. In addition, we are planning to agree on the joint implementation of Double-Degree Program with the Polytechnic School of the University of São Paulo, Brazil, and the Graduate School of Industry of Pukyong National University, Korea.

Graduate School of Engineering, Yokohama National University and Changwon National University Agreed on Joint Implementation of Double-Degree Program

In June 4, 2014, at Changwon National University (CWNU) in Changwon city, South Korea, a signing ceremony of the Agreement on the Joint Implementation of Double-Degree Program between Graduate School of Engineering, Yokohama National University (YNU) and Changwon National University was held having the attendance of President of Changwon National University, Dean of Graduate School of CWNU, Atsuo Kawamura, Dean of Graduate School of Engineering, Hiroshi Fukutomi, Professor and Osamu Umezawa, Professor of Graduate School of Engineering.

YNU signed the agreement between Faculties on exchange program in April 2008. In the field of materials engineering, Department of Solid State Materials and Engineering, YNU and School of Nano and Advanced Materials Engineering, CWNU have been alternately hosting joint symposium to exchange the achievement of studies conducted by undergraduate and graduate students and faculties every year. This year, it is held at YNU from August 7 to 9.

In February 2011, to expand the exchange program implemented in the field of engineering to an entire university-level at the both universities, an education exchange agreement between the universities was concluded. The signing ceremony in Korea was conducted having the attendants of Kunio Suzuki, President, Yasuo Kokubun, Executive Director, and Osamu Ishihara, the then Head of Faculty of Engineering from YNU. At that time, the universities discussed the launch of double-degree program that enables students to obtain degrees from both universities. As Department of Solid State Materials and Engineering in Division of Systems Integration and School of Nano and Advanced Materials Engineering promoted communication, the universities thoroughly examined possible Double-degree Program and finally reached the agreement.

Initial Double-degree Program will be a three-year program for Master students to study at graduate schools of both universities. However, the both

parties have already agreed on expanding the course to doctorate degree. For the launch of the program, YNU will establish a new system, which allows participants to become a regular student of the two universities for three years. With the system, students will pay tuition only to the dispatching university, and receive the exemption of tuition from dispatched university. To participate in this program, students require recommendation from the graduate school that he/she originally belongs. Since the program offers multiple master degrees in the same field, the students who completed the program are expected to move up to the doctoral program to obtain more advanced research skills.

With the Agreement, every area of Graduate School of Engineering can promote Double-degree program. However, for the actual execution, each area needs to agree and add more details to the Agreement including implementation methods such as curriculums. In various areas of Graduate School of Engineering, it is expected that Double-degree program promotes close communication with CWNU, and significantly contribute to the advancement of the education and research of both universities.



Commemorative picture taken after the signing ceremony of the Agreement on the Joint Implementation of Double-Degree Program: President Chan-Gyu Lee of CWNU (center), Sang Su Kim, Dean of Graduate School of CWNU (left) and Atsuo Kawamura, Dean of Graduate School of Engineering (right) of YNU.

2013-14 Highlights

Renovation of ES Tower to Improve Circumstances for English Study

The faculty has prepared several different plans for improving English study conditions for undergraduates and graduates since 2012. In 2013, the first step of renovation of the ES Tower (Engineering Science / English Study / Enshu Suzuki, who is the first principal of the predecessor of Faculty) was performed. The details of the renovation are described below;

Remote Lecture System for Overseas Classes

A new global remote lecture system was placed in the Global Lecture Room (1st floor), and offers world-wide opportunities for direct contact between domestic students and foreign professors in real time, providing a global educational experience. Since the studio system is designed by following de facto protocol of remote lecture systems, we can extend the network in a world-wide academic field as well as connect to domestic centers of excellence, and facilitate interactive discussions between YNU and overseas students and professors. In the future, we will provide original lecture content with English for on-demand

lecture streaming services through this system.

Video Recording Room for Readiness Assurance

Because almost of all lectures in the graduate college shall be performed in English as of 2014, readiness assurance is vital. A video recording room was provided on the 1st floor for taping and preparation of lesson and/or lectures.



Global Lecture Room;
Remote lecture system shall enhances global communi-cation.

Digital Signage System for English Study

Two study rooms are provided on the 2nd floor, and the students can receive many kinds of educational materials through digital signage systems. These rooms may occasionally be used for group work such as the Project Management Program.

Remote Experiment Class in Physics

On the 3rd floor, specific experiment facilities are provided for Global Physics Experimental. They are composed of 80-inch IT screens and 8 tablet computers with full audio equipment, connected to a server via LAN at each experimental table. It will be available to provide English content of experiments in physics for students.



Remote Experiment Class;
Experimental contents in physics in English guides students.



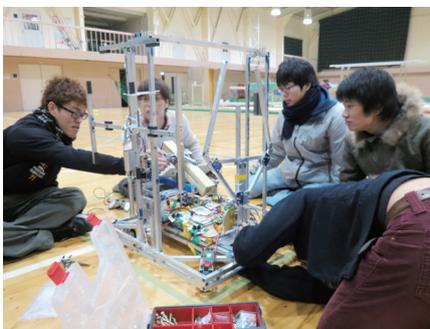
Video Recording Room;
Video and authoring tools are equipped.



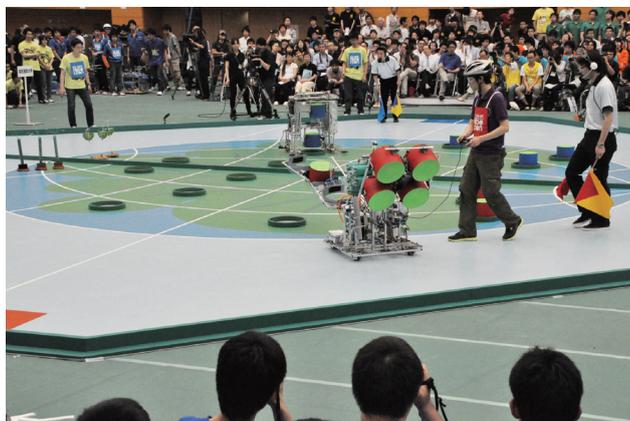
Digital signage System;
Students can receive educational materials in any time.

NHK Daigaku Robocon 2013

Participation in the Qualifying Trial for ABU Asia-Pacific Robot Contest



Assembling a robot



During the match



Commendation ceremony

NHK Daigaku Robocon is a robot competition for all universities in Japan. Every year, about 45 universities participate. It is conducted in a matching style between two teams, blue and red. A team which solved a task faster wins. The task of 2013 was to operate independently produced manual and automatic robots. They were supposed to move to the field with a picture of earth while locating green "leaves" at designated spots on the way. Then, at the field, the robots were supposed to shoot "a seedling", which was created by the team, to a table, which represents the Moon, and make it land on it.

"Robo+ism" of Yokohama National University was recently formed with the solicitation of a student of Department of Mechanical Engineering and Materials Science. The team has no experienced members: members had never built a robot, or even touched microprocessor. In addition, the team did not have a venue for the activities, tools and equipment. So, they practically started from nothing. So, they visited other universities which have participated in the competition before, and collected information on the basic technologies for

robot production and team management. Based on the information, they set up departments within the team, and each department arranged study sessions. Fortunately, Mechanical System Course kindly provided a venue for activities. The team obtained the cooperation from a machine shop to produce two robots. They cleared screening for three times, and were accepted to participate in the Qualifying Trial.

After all, the team was unfortunately eliminated in the preliminary competition. However, the participation to the competition after forming the team only a year ago was highly evaluated, and the team was granted Special Prize by Mabuchi Motor Co., Ltd. The competition was widely reported through NHK Sogo television.

Through the activities, the members experienced the difficulties of making things and the joy to conquer them. They also learned manufacturing technologies, project execution method and the challenge of team management, and reconfirmed the importance of theories. Based on the experience, they are expected to leap further.

Awards Received by Students of College of Engineering Science, College of Engineering and Graduate School of Engineering

| Name of prize winner [Supervisor] | Name of award (Date of receipt) | Comment (Person granted, etc.) |
|---|---|---|
| UEHARA Naoki, OKADA Yohei, Graduate School of Engineering (Group name: Energy Conversion Chemistry Laboratory) [Professor MITSUSHIMA Shigenori] | Best Poster Award (2014.3.30) | Association of Fuel Cells, The Electrochemical Society of Japan |
| Civil Engineering Program (EP), College of Engineering Science Student Team [Professor KATSUCHI Hiroshi] | The Third Place (Comprehensive ranking) (2014.3.21) | ASIA BRICOM 2014 Executive Committee |
| TSUCHIYA Taiki, College of Engineering HIROKANE Yuri, College of Engineering Science [Professor NAGAO Tomoharu] | Best Poster Award, Student Poster Session (2014.3.20) | The Institute of Electronics, Information and Communication Engineers |
| KATO Yuuto, Graduate School of Engineering [Professor KAMINOYAMA Meguru] | The Society of Chemical Engineers, Japan, the 79th General Meeting, Student Award, Bronze (2014.3.19) | The Society of Chemical Engineers, Japan |
| SUZUKI Takuma, College of Engineering [Professor KAMEYA Takashi] | Award for Outstanding Presentation (2014.3.18) | Japan Society on Water Environment |
| SAITO Yoshihito, Graduate School of Engineering [Associate Professor MAEDA Yusuke] | The Japan Society of Mechanical Engineers, Production System Department, Award for Outstanding Presentation (2014.3.17) | The Japan Society of Mechanical Engineers Manufacturing Systems Division |
| TOMURA Shun, College of Engineering [Professor KAMINOYAMA Meguru] | Society of Sea Water Science, Japan, Young Generation Group, the 5th Student Presentation, Award of Excellence (2014.3.6) | The Society of Sea Water Science, Japan |
| Be Song-Ming, College of Engineering [Associate Professor Raebiger Hannes] | Award for encouragement of Research in Materials Science (2014.1.16) | MRS Japan |
| SATO Minako, College of Engineering [Associate Professor HAYANO Kimitoshi] | The 42nd "Symposium on Rock Mechanics" Award for Outstanding Paper (2014.1.10) | Rock Mechanics Committee, Japan Society of Civil Engineers |
| YOKOSE Kento, Graduate School of Engineering [Professor HAMAGAMI Tomoki] | Best Session Paper Award (2013.11.14) | The 14th International Symposium on Advanced Intelligent Systems |
| AONO Hiroyuki, Graduate School of Engineering [Associate Professor FUCHIWAKI Ohmi] | Best Paper Award (2013.11.14) | Asian Society for Precision Engineering and Nanotechnology (ASPEN2013) |
| OZAWA Ryota, Graduate School of Engineering [Associate Professor MARUO Shoji] | Best Paper Award in 2013 International Symposium on Micro-NanoMechatronics and Human Science (MHS 2013) (2013.11.13) | IEEE Robotics and Automation Society |

| Name of prize winner [Supervisor] | Name of award (Date of receipt) | Comment (Person granted, etc.) |
|--|---|--|
| Shihong Yin, Graduate School of Engineering (Group name: Energy Conversion Chemistry Laboratory) [Professor MITSUSHIMA Shigenori] | Best Poster Award (2013.11.12) | Fuel Cell Related Catalyst Division, Catalysis Society of Japan |
| MITSUIKE Kazunari, Graduate School of Engineering [Associate Professor ICHIYANAGI Yuko] | Best Poster Award (2013.11.8) | Chairman of the 7th ISNM 2013, S. Takenaka (Shiori Takenaka, Chairman of Nanomedicine Symposium Executive Committee) |
| MARUOKA Naru, Graduate School of Engineering [Associate Professor MORI Shoji] | Student Presentation Award in JSMF Multiphase Flow Symposium 2013 (2013.10.26) | The Japanese Society for Multiphase Flow |
| YOSHIZAWA Ryuta, Graduate School of Engineering [Associate Professor OCHIAI Hideki] | IEEE VTS Japan 2013 Student Paper Award for Outstanding Student Paper (2013.9.3) | IEEE VTS Japan Chapter |
| BABA Kensuke, Graduate School of Engineering [Professor KAWAMURA Atsuo] | The Institute of Electrical Engineers of Japan, Award for Outstanding Paper (2013.8.29) | The Institute of Electrical Engineers of Japan |
| BANTO Yuuma, Graduate School of Engineering [Associate Professor NISHI Kazuhiko] | The Society of Chemical Engineers, Japan, Morioka Meeting, Student Award, Special Award (2013.8.8) | The Society of Chemical Engineers, Japan, Kanto, Tohoku and Hokkaido Branches |
| SUGIYAMA Hitomi, Graduate School of Engineering [Associate Professor KANAI Toshimitsu] | The Society of Chemical Engineers, Japan, Morioka Meeting, Student Award, Bronze (2013.8.8) | The Society of Chemical Engineers, Japan, Kanto, Tohoku and Hokkaido Branches |
| HORI Yusuke, Graduate School of Engineering [Professor ARAI Hiroyuki] | Applications and Student Innovation Competition/Third Prize (2013.8.2) | 2013 IEEE International Workshop on Electromagnetics |
| Jinuk Kim, Graduate School of Engineering [Professor FUKUTOMI Hiroshi] | Paper Award (Academic Paper) (2013.6.6) | The Japan Society for Heat Treatment |
| Shihong Yin, Graduate School of Engineering (Group name: Energy Conversion Chemistry Laboratory) [Professor MITSUSHIMA Shigenori] | Best Poster Award (2013.5.28) | Fuel Cell Development Information Center |
| MATSUO Kazuya, Graduate School of Engineering (Completed the first half of doctoral course in 2012) [Professor TAKAHASHI Koji] | Science and Technology Award, Promotion Award (2013.5.24) | High Pressure Institute of Japan |
| GOTO Wataru, Graduate School of Engineering [Professor HIROSAWA Shoichi] | Best Poster Award (2013.5.18) | The Japan Institute of Light Metals |

Extracted from http://www.ynu.ac.jp/education/ynu_research/result/award.php?y=2013

Student Exchange Program

Short Stay (SS) Program, Short Visit (SV) Program

Recently, we have been conducting student exchange programs between Yokohama National University (YNU) and foreign universities based on the Student Exchange Support Program (scholarship program) by the Japan Student Service Organization (JASSO). In this year, we conducted two types of student exchange programs with two foreign universities, Shanghai Jiao Tong University (SJTU) in China and Pukyong National University (PKNU) in Korea. The academic fields of this exchange program are naval architecture and ocean engineering (SJTU), and material engineering (PKNU).

(i) Mutual Academic Exchange Program (Two-week program)

In this program, we accepted 10 and 8 students from SJTU and from PKNU respectively, and conducted a two-week educational program (SS program). Also, we sent 10 and 6 YNU students to SJTU and PKNU respectively, and the students attended the educational program conducted by the universities (SV program). In the educational programs, lectures of the specialized fields, student workshops (presentations), technical tours, cultural programs, and other events were successfully conducted in English.

Fig.1 SV Program (SJTU, PKNU)



(ii) Short Internship Program (Three-month program)

In the Short Internship Program, we accepted 3 students from SJTU (SS program), and sent 4 YNU students to SJTU (SV program). In this program, each student was assigned to a certain laboratory for about three months, and carried out research work while supervised by the professor in that laboratory. The field of their research was naval architecture and ocean engineering. Below are the themes of the studies carried out by the students.

- Numerical Analysis for the Roll Stabilization of a Purse Seiner using Vertical Weight Stabilizer System
- A Study on Risk Functions and Optimization of Distribution Control Methods for Reduction of Sloshing Risk in FLNGs
- Design of Truncated Mooring System with INSGA-II
- Prediction of Welding Deformation for Large Structure Based on Inherent Deformation Theory
- Measurement and Calculation of Wind Condition for Offshore Wind Turbine Experiments
- A Study of Cohesive Element and its Application in Crack Process Simulation
- A Basic Experiment for ROV Vertical Motion under Regular Wave and its Depth Control

Fig.2 SS Program (SJTU, PKNU)



The students who participated in the student exchange program acquired further knowledge of their specialized field. Moreover, by communicating with foreign students in the workshop or in the laboratory, they came to know the importance of international communication and the difference in culture between their countries. We hope that the students will become well-qualified engineers and researchers in the future who will be active on the international stage.

Reference

Number of participants by year (Short stay: Mutual Academic Exchange)

| Name of dispatched university | 2011 | 2012 | 2013 | Total |
|-------------------------------|------|------|------|-------|
| SJTU→YNU | 10 | 10 | 10 | 30 |
| PKNU→YNU | 9 | 10 | 8 | 27 |
| PKU→YNU | 10 | 0 | 0 | 10 |
| Total | 29 | 20 | 18 | 67 |

* SJTU : Shanghai Jiao Tong University
 PKNU : Pukyong National University
 PKU : Peking University
 YNU : Yokohama National University

Number of participants by year (Short Stay: Short Internship Program)

| Name of dispatching university | 2011 | 2012 | 2013 | Total |
|--------------------------------|------|------|------|-------|
| SJTU→YNU | 3 | 3 | 3 | 9 |
| PKNU→YNU | 3 | 3 | 0 | 6 |
| PKU→YNU | 3 | 2 | 0 | 5 |
| Total | 9 | 8 | 3 | 20 |

Number of participants by year (Short Visit: Short Internship Program)

| Name of dispatched university | 2011 | 2012 | 2013 | Total |
|-------------------------------|------|------|------|-------|
| YNU→SJTU | 10 | 10 | 10 | 30 |
| YNU→PKNU | 10 | 10 | 6 | 26 |
| YNU→PKU | 7 | 1 | 2 | 10 |
| Total | 27 | 21 | 18 | 66 |

Number of participants by year (Short Visit: Short Internship Program)

| Name of dispatched university | 2011 | 2012 | 2013 | Total |
|-------------------------------|------|------|------|-------|
| YNU→SJTU | 3 | 3 | 4 | 10 |
| YNU→PKNU | 3 | 2 | 0 | 5 |
| YNU→PKU | 3 | 7 | 0 | 10 |
| Total | 9 | 12 | 4 | 25 |

* Graduate School of Environment and Information Science was in charge of SS/SV with Peking University.

Engineering Research Management Learning Program

Faculty of Engineering Management Learning Program provides students in the latter half of doctoral course with the opportunities to experience the cycle of "research planning, research fund acquisition, research execution managing research fund, the publication of the results to the public and returning the profit to society."

Students apply for the program with his/her research plan. Judging Committee conducts assessment to decide the provision of research expenses, etc. The purposes for which research

expenses is spent are limited to (1) travel expense and participating fee to attend an academic society and symposium held in Japan and foreign countries to present the research outcome and study research trend, and (2) consumables used for research such as chemical agents, materials and parts. In addition, after the end of the research period, students shall plan and provide an occasion to present the research results along with a lecture meeting.

This Learning Program started from 2005, and the number of participants by 2014 amounted to 136.

The number of participants by fiscal year

| Major | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|------------|
| Department of Materials Science and Engineering | 9 | 4 | | 4 | 1 | 3 | 2 | 3 | 1 | 4 | 31 |
| Department of Systems Integration | 2 | 2 | 1 | | 2 | 1 | | 2 | 2 | 0 | 12 |
| Department of Civil Engineering and Architecture | 10 | 5 | 3 | 3 | 8 | 6 | 4 | 1 | | | 40 |
| Department of Physics, Electrical and Computer Engineering | 9 | 5 | 7 | 3 | 3 | 4 | 5 | 6 | 4 | 7 | 53 |
| Total | 30 | 16 | 11 | 10 | 14 | 14 | 11 | 12 | 7 | 11 | 136 |

Graduate School of Engineering PED Education Program, Overseas Internship Support

| Fiscal year | The number of students supported | Total amount of financial aid | Dispatched country |
|-------------|----------------------------------|-------------------------------|--|
| 2008 | 7 | 3,080 | China (Shanghai), Denmark (Copenhagen) Netherlands (Amsterdam), Portugal (Lisbon) Spain (Barcelona), United Kingdom (Southampton) |
| 2009 | 7 | 3,557 | Netherlands (Amsterdam), Spain (Islas Canarias) Australia (Brisbane), Thailand (Bangkok), Sweden (Stockholm) United States (State of Texas), China (Shanghai) |
| 2010 | 11 | 4,936 | Netherlands (Amsterdam), Norway (Stavanger), Brazil (Curitiba), Spain (Barcelona), Portugal (Lisbon), Thailand (Bangkok, Chonburi) |
| 2011 | 4 | 1,608 | United States (Louisiana), Brazil (Sao Paulo), Australia (Melbourne) |
| 2012 | 6 | 2,631 | United States (Michigan Newark Louisiana), Germany (Aachen) Belgium (Brussels), Australia (Queensland) |
| 2013 | 28 | | United States (Piscataway), Germany (Aachen Potsdam) Norway (Sandefjord) Australia (Newcastle), Czech Republic (Bruno Ostrava), Switzerland (Zurich) Netherlands (Delft), China (Beijing, Shanghai), Republic of Korea (Pusan Kwangju) |

* For 2014, there were only cases of Overseas Internship, but no cases of PED Internship.

Graduate School of Engineering Research Fellowship/Scholarship Student

This scheme was adopted in 2007 to increase the number of enrollments to the doctoral course, financially support students and raise the number of people who are employed as special researchers (DC1/DC2) by Japan Society for the Promotion of Science.

The students who are qualified to the scheme are hired as RA, and classified into Graduate School of Engineering Research Fellowship who receives salary and Graduate School of Engineering Scholarship Student who receives payment only as scholarship.

The salary and scholarship are provided after entering the doctoral course for a year. The payment can be extended up to three years based on assessment. However, when a student is employed as Research Fellowship for Young scientists of Japan Society for the Promotion of Science (DC1/DC2), the payment is terminated.

Since the introduction of the scheme in 2007, 51 Research Fellowship and 19 Scholarship Student have been recognized. Twenty students were hired as Research Fellowship for Young scientists of Japan Society for the Promotion of Science.

| Fiscal year | Number of Research Fellowship | Number of Scholarship Student | Number of students who were hired by Japan Society for the Promotion of Science |
|--------------|-------------------------------|-------------------------------|---|
| 2007 | 8 | 0 | 1 |
| 2008 | 8 | 1 | 6 |
| 2009 | 7 | 2 | 4 |
| 2010 | 3 | 3 | 1 |
| 2011 | 3 | 1 | 2 |
| 2012 | 6 | 3 | 1 |
| 2013 | 7 | 6 | 4 |
| 2014 | 9 | 3 | 1 |
| Total | 51 | 19 | 20 |

* Breakdown of the number of Research Fellowship and Scholarship Student employed each fiscal year

2013-14 Highlights

Highlight of Research

Aiming to Pursue the Depth of Science and Engineering Education

(Vice Dean in Charge of Research) *Masayoshi Watanabe*

The faculty of engineering is aiming at conducting cutting-edge international research through global collaboration under competitive conditions. We have also recently been strongly recommended by MEXT (Ministry of Education, Culture, Sports, Science and Technology) for having our own unique features which distinguish us from other universities. Under such circumstances, our faculty welcomed a new Dean, Prof. Kawamura, from April, 2013. He proposed new ways to make our faculty high-spirited, and collected opinions from all faculty members regarding how to do so. I introduce herein highlights of our research as well as our attempts to make our faculty more high-spirited. Of course these attempts are underway, but must continue to make every endeavor to have skilled and respected research and researchers.

Cutting-edge International Research

Cutting-edge international research consists of star research projects selected by the faculty as “*Interdisciplinary Collaborative Research Projects*”. We currently have 3rd-term research projects (2012-2016) and 6 projects ongoing in our faculty (page 15-18) relating to “*clean energy materials and devices*”, “*advanced photosciences and photofunctional materials*”, “*bioanalysis and nanomedicine*”, “*smart human engineering*”, “*advanced magnetic and superconducting materials and devices*” and “*biomedical engineering by interdisciplinary fusion*”. Researchers active in these projects may acquire significant research funding, and are strongly promoting their research.

In order to lay the foundation for cutting-edge international research, our faculty has promoted group research, which combines interdisciplinary yet related researchers into one team. When a group research project achieves great success, such research will be recognized as a “*Interdisciplinary Collaborative Research Project*”, which is our promotion system. Beginning this year, all group research will be replaced by “*Kakenhi groups*”, a move which aims to facilitate group research as well as to get Kakenhi (Grant-in-Aid for Scientific Research by MEXT, fundamental cornerstone of research funding in Japan) as a financial research resource. At the same time, we designed a safety net for when we fail to acquire a sufficient budget in spite of a relatively high ranking.

“*2013 YNU Distinguished Researcher Awards*” were presented to the following faculty researchers: Prof. Osamu Ishihara (Best Research Award) and Prof. Koji Takahashi (Technological Progress Award), honors for which we are delighted.

Research Under Competitive Conditions

It is essential for research-focused universities to conduct research under competitive conditions, while at the same time award suitable positions to faculty members who have made honorable achievements. Our faculty created a strict guideline for promotion. We have also established a tenure-track system to employ new faculty, especially young members, which was financially supported by MEXT. During the tenure track (standard length: 5 years), faculty can concentrate on their own research. For active researchers acquiring a large amount of competitive research funds, we established incentive funds for research and personnel. Continuous efforts should be made to conduct research under fair competitions.

Global Collaboration

Global collaboration in our faculty has been conducted based on personal connections. We have signed a worldwide memorandum of understanding between numerous faculties and universities (page 31-33). Collaboration and exchange of faculties and students have also been actively carried out. In addition, we embarked upon systematic global collaboration in 2012, supported by the Japan Society for the Promotion of Science, under the program of “*Strategic Young Researchers Visit Program for Accelerating Brain Circulation*” (page 34). We selected 5 overseas universities and national institutes for collaboration, focusing mainly on materials science. Young faculty and students (brain) frequently visit these institutions (circulation) in order to conduct global collaboration and we also receive faculty and students to our own institution. We expect to develop these new foundations of global collaboration through the efforts of our young faculty.

Interdisciplinary Collaborative Research Project (3rd-term)

Yokohama Clean Green Project

Masayoshi Watanabe

The eventual goal of this project is to contribute to the establishment of a sustainable society with low CO₂ emissions by utilizing research resources in YNU. These resources include advanced research relating to “Clean Energy Materials and Systems”. Examples include research on “Ionic Liquids”, “Electrocatalysts” and “Porous Materials”. Through these research projects, our anticipated results include: next generation batteries, fuel cells, solar cells, green catalysts, green H₂ production and storage, CO₂ separation and storage, and separation/recovery/recycling of rare elements and radioactive materials. Needless to say, the current state of science and technology surrounding these research topics supports a sustainable society as fundamental and indispensable resources. This project also cooperates with the Research Center for Green

Materials Innovation (GMI) in YNU, which aims at academic/private/public cross-sector collaboration in terms of research and education.

This year, two symposiums were held on this project, in which YNU young scientists presented their research seeds, one of which was a joint symposium with a public sector entity, the Kanagawa Industrial Technology Center.

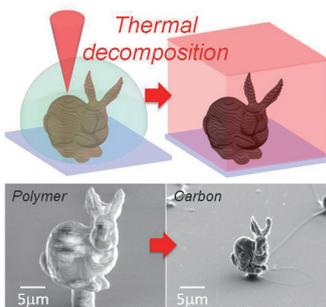


Innovations in Advanced Photoscience and Photofunctional Materials

Yasushi Yokoyama

The title research project of the Faculty of Engineering aims at gathering researchers together to pursue innovative research related to “Light” as the common key word. The research project consists of four subgroups.

Photobioscience Subgroup is researching on the working mechanisms of bacteriorhodopsin, the light-driven proton pump of halobacteria. Interpretation of the photoreaction cycle of bacteriorhodopsin has been revealed by in situ photoirradiation solid state NMR measurements.



Maruo's Micro-Rabbit made of amorphous carbon produced from a novel photopolymer by the precise two-photon microfabrication.

Various laser spectroscopic measurement methods have been developed in Advanced Spectroscopy Subgroup recently. They have been applied to the analysis of several photophysical phenomena within this academic year, and their usefulness has been unveiled.

By using human serum albumin (HSA) as the stereoregulating template, Photofunctional Materials Subgroup achieved more than 70% enantioselectivity of the photochromic ring closure of a diarylethene.

Optics Devices Subgroup proved the wide temperature range operation (19-124 °C) in Si optical modulators for the first time. Large-scale integration of 10,000 photonic crystal nanolasers was also achieved. A novel photopolymer suitable for the production of amorphous three-dimensional carbon microstructures via two-photon microfabrication has been developed (see Figure).

Innovative devices and materials for nanomedicine and living body analysis

Yuko Ichiyanagi

Our goal is to develop scientific materials and electronic devices as well as measurement technology toward life innovation concerning medical, health, and nursing care.

This project is run by researchers representing such disciplines as physics, biology, medicine, electrical engineering, and domestic science, who meet several times a year for interactive discussions. It is our central scheme at these meetings to exchange practical suggestions for complex science and the collaborative development of strategic devices.

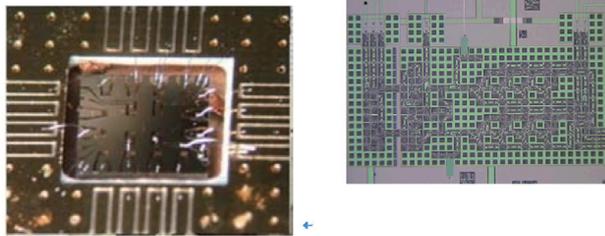
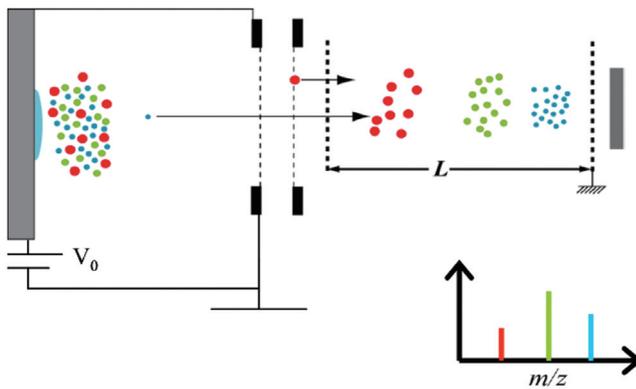
Development of magnetic hyperthermia as a cancer therapy, biosensors, and detectors is now

in progress.

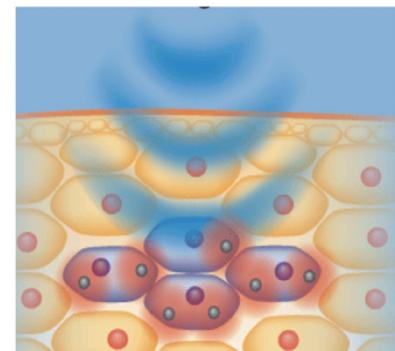
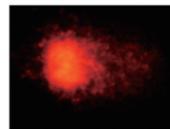
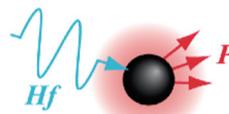
If we could establish a measurement system of the differentiation process, it would contribute to possible prevention of disease and clarification of pathogenesis. We aim to improve the current analysis methods and evaluation techniques to solve problems facing the human race.

We have organized and administered lecture sessions by Nobel Prize winners and prominent scholars from countries including Germany, Russia, and France.

Our project is drawing attention globally, and therefore we are going to continue presenting research results to the world.



MALDI-TOF-MS system, Superconductive detector, SFQ Circuit



Cancer therapy

Smart Human Engineering

Hajime Takada

We have developed a method for modifying the shapes of existing uniform bi-cubic B-spline surfaces by interactively editing the curvatures along isoparametric curves. Such shape specifications are converted into iterative repositionings of the control points on the basis of geometrical rules. Using these point-based curvature-editing techniques, we successfully embedded log-aesthetic curves into existing surfaces along their isoparametric curves (see Fig.1).

For an advanced manipulation system, we have developed a linear and rotational two-degrees-of-freedom motor. This motor requires information on the linear and angular positions of the rotor for its control. The motor's built-in position sensing system, using photoelectric switches and two different light sources, can independently detect combined linear and rotational motion of the rotor, such as twist and push-pull in a manipulator (see Fig.2).

In recent years, various assistance robots have been researched and developed for the aging problem, but it has not yet been used extensively because of high costs or the length of time needed to prepare it for use. Therefore, walking assistance devices have been developed for elderly persons who are unable to walk smoothly. The device works when a subject steps forward with one leg. The limitation of the device is about one thirds or one fourth of the average waking stride for safety reasons (see Fig.3).

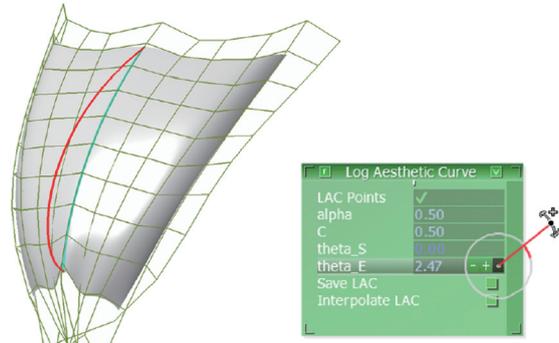


Fig.1 Log-aesthetic curves

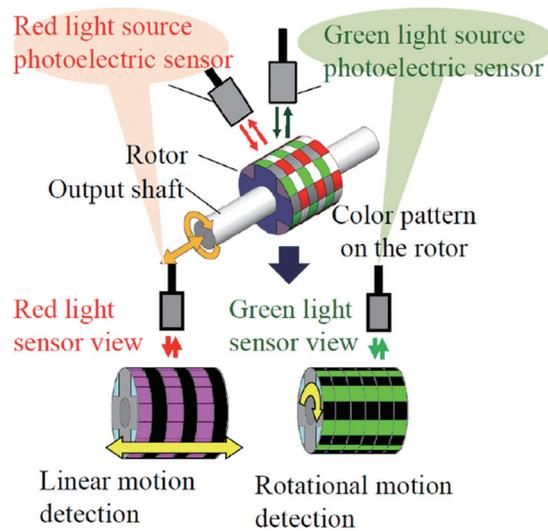


Fig.2 Noncontact linear and rotational motion sensor



Fig.3 Walking assistance device

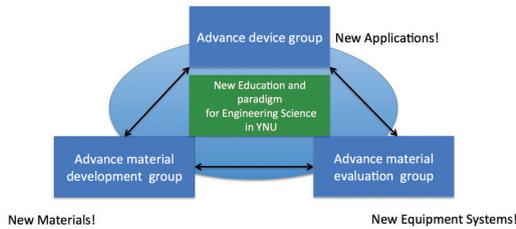
Advanced Science and Technology for Magnetism and Superconductivity in YNU

Izuru Umehara

The Purpose and Expectations of This Group

Since 2012, this project has sought to create a new paradigm in the research fields of education

Advanced Science and Technology for Magnetism and Superconductivity in YNU



of engineering science at YNU. This project is comprised of three groups; the material development group, the material evaluation group and the device group, in order to cover aspects of basic physics in addition to the applications of magnetism and superconductivity. The members of this project are interested in the wide research fields of magnetism and superconductivity, and are eager to interact with each other. The final goal of this project is to create new engineering science education systems for students via interaction with different fields of research.

Creation of Sustainable Medical Social Infrastructure Using Latest

Ryuji Kohno

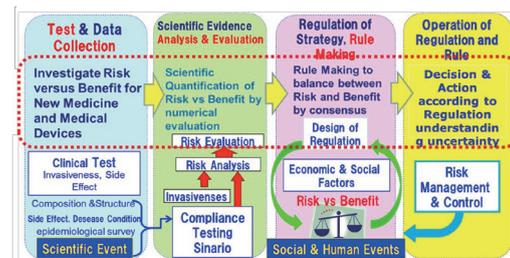
Technologies Based on Innovative Integration between Medicine and Engineering / Social and National Sciences -- International Standardization, Regulation Making, and Global Business Promotion Based on Collaboration among Industry, Government, and Academia Including Inter-University Cooperation

R&D and Standardization of Medical Wireless Body Area Network (BAN)

We have researched and developed wireless body area network (BAN) for ubiquitous and remote medicine and succeeded BAN's international standard IEEE802.15.6 established in February, 2012. Highly reliable and secure, i.e. dependable BAN can be applicable to a body of cars, buildings as well as a human body for dependable machine – to – machine (M2M) sensing and controlling. Such a M2M network can be called as "BAN of Things" like Internet of Things (IoT). To perform dependability of BAN, cross-layer and multi-layer of technologies must be jointly optimized. Even after BAN has been developed and standardized in global, regulatory science must be keen to guarantee reliability and security to be compliant for regulation.

Global Business of BAN Based on Regulatory Science

In order to maintain sophisticated medical social infrastructure and succeed global business of BAN, its compliance for medical regulation for safe and secure medical treatment must be crucial as well as international standardization for global business with huge market. We have investigated compliance testing based on "Regulatory Science," by which risk versus benefit of newly invented medical devices have been analyzed and evaluated, and then regulation for medical devices should be established with citizen consensus. To promote research and education for regulatory science for medical devices, we have coordinate collaboration of faculties between social and natural sciences in YNU.



Regulatory Science for Clinical Use of Medical Devices and Medicine

Research Units: Phase 3 2011-2013

| Subjects | | Principal Investigators |
|----------|--|--|
| 1 | Advanced Laser Spectroscopy and Nanoscience | Professor TAKEDA Jun |
| 2 | Development of Space Debris Catcher Using Active Materials | Associate Professor NAKAO Wataru |
| 3 | Search for New High-Jc Superconductors Useful for Technological Applications | Associate Professor UEHARA Masatomo |
| 4 | Creation and Analysis of Photon-Working Materials with Novel Functions | Professor YOKOYAMA Yasushi |
| 5 | Dynamics of Amino Acid Molecules on Solid Surfaces | Professor TANAKA Masatoshi |
| 6 | Analysis of Formation Processes of Ultrathin Oxide Films on High-Index Silicon Surfaces | Assistant Professor OHNO Shinya |
| 7 | Study of Functional Biological Molecules in the Cell Membrane by Means of Structural Biology | Professor NAITO Akira |
| 8 | Microbial Metal Element Cycle: Cell Structure and Dynamics | Professor KOIZUMI Junichi |
| 9 | Integrated Approach to the Research of the Conformations and Functions of Carbohydrates from Bio, Analytical, and Computational Chemistries, and Nano-Technology | Professor UEDA Kazuyoshi |
| 10 | Structure Analysis of Ordered Porous Materials by High-Resolution Solid-State NMR Spectroscopy | Professor KUBOTA Yoshihiro |
| 11 | Research on Ultra-High Performance Optical Modulators and Switches | Associate Professor ARAKAWA Taro |
| 12 | Advanced Motion Control of Haptic Mobile Robot | Assistant Professor SHIMONO Tomoyuki |
| 13 | Green Nanotechnology | Associate Professor OYA Takahide |
| 14 | Study of the Power Transaction Support System for Regional Energy System Using Multi-Agent Technology | Professor OYAMA Tsutomu |
| 15 | Study of Human Integrated Modeling and Medical Application Utilizing BAN Systems | Associate Professor SUGIMOTO Chika |
| 16 | Performance Improvement of Polymer Electrolyte Fuel Cells by Optimizing Mass Transfer Characteristics | Associate Professor ARAKI Takuto |

Research Units: Phase 4 2013-2015

| Subjects | | Principal Investigators |
|----------|--|--|
| 1 | Visualization of the Effects of Nuclear Radiation | Professor SAKAKIBARA Kazuhisa |
| 2 | Structure Analysis of Porous Catalytic Materials by High-Resolution Solid-State NMR Spectroscopy | Professor KUBOTA Yoshihiro |
| 3 | Study of Mathematical Structure of Quantum Walks | Professor KONNO Norio |
| 4 | Advanced Additive Manufacturing | Associate Professor MARUO Shoji |
| 5 | Development of a Mechanical Test Method for Granular Media-Machine Systems Under Variable Gravity Fields | Associate Professor OZAKI Shingo |

YNU Research Project list

FY 2011 Approved

| Project | Content | Leader | |
|---------|--|--|--|
| 1 | Research Center for Maritime Technologies to Protect Ocean Environments | Research and development of a ballast-free ship | Professor ARAI Makoto |
| 2 | Ray-Lite : Research Association in Yokohama for Light-Triggered Events | Creation and analysis of photon-working materials with novel functions | Professor YOKOYAMA Yasushi |
| 3 | Research Center for Human Function Reacquisition by Engineering | Research on human function reacquisition by engineering | Professor TAKADA Hajime |
| 4 | Research Center for Space-Environment Utilizing Science | Examination and preparatory experiments for studies on materials science and life science by utilizing space environments | Professor KOBAYASHI Kensei |
| 5 | Research Center for Ditching Experiment of Aircraft in Experimental Towing Tank | Experimental study of aircraft ditching and flying boat alighting | Assistant Professor HIRAKAWA Yoshiaki |
| 6 | Research Center for Advanced Laser Spectroscopy and Nanoscience | Development of new laser spectroscopic techniques applicable to nanomaterials science | Professor TAKEDA Jun |
| 7 | Research Center for Advanced Superconducting Materials and Devices | Study of new superconducting materials and devices, and their development for application | Professor YOSHIKAWA Nobuyuki |
| 8 | Research Center for Low Temperature Science | Development of new equipment for physical properties measurements at low temperatures, and promotion of cooperative research on low temperature physics | Professor SUZUKI Kazuya |
| 9 | Research Center for Nanoscopic Physics and Biomedicine | Investigation of magnetic nanoparticles targeting highly precise molecular imaging | Associate Professor ICHIYANAGI Yuko |
| 10 | Robotics and Mechatronics Research Center (RMRC) | Research and development of advanced robotics and mechatronics technologies | Professor FUJIMOTO Yasutaka |
| 11 | Green Hydrogen Research Center | Materials, systems and networks for innovative energy systems based on renewables | Professor MITSUSHIMA Shigenori |
| 12 | Innovative Integration Between Medicine and Engineering Based on Information Communications Technology (G-COE) | Research focused on "medical information communications technology (ICT)", which is innovative integration between the world's most advanced ICT and highly demanded medical services. | Professor KOHNO Ryuji |

FY 2012 Approved

| Project | Content | Leader | |
|---------|---|--|--------------------------------|
| 1 | Research Center for Advanced JISSO Technology, Yokohama | Innovative JISSO electronics technology development for future electronics, which will solve various problems and create a brighter future, by integrating the various engineering fields, such as materials, device, process, design and evaluation | Professor HABUKA Hitoshi |
| 2 | Research Center for Regulatory Science and Technology for Advanced Medicine | Provide effective flow of new medicines, technologies and human resources into the medical field | Professor KOHNO Ryuji |

* In 2013, Professor Kohno was involved in the Center for Future Medical Social Infrastructure Based on Information Communications Technology.

FY 2013 Approved

| Project | Content | Leader |
|--|--|-----------------------------------|
| 1 Research Center for Fundamental Technology and Information Transmission of Cosmetic Development in the Next Ten Years | Fundamental technology and information transmission for safe cosmetics | Professor ITAGAKI Hiroshi |
| 2 Research Center for Ocean Renewable Energy | Experiment on performance of technology for ocean renewable energy, creation of innovative methods for renewable energy extraction, and comprehensive evaluation of economic and environmental impacts of ocean renewable energy | Associate Professor NISHI Yoshiki |

Awards Received by Professor of Faculty of Engineering

| Name of prize winner [Supervisor] | Name of award (Date of receipt) | Comment (Person granted, etc.) |
|--------------------------------------|--|---|
| Professor FUKUTOMI Hiroshi | Doctor Emeritus (2014.3.31) | VSB-Technical University of Ostrava |
| Associate Professor KATAYAMA Ikufumi | The 8th Young Scientist Award of the Physical Society of Japan (2014.3.28) | The Physical Society of Japan |
| Associate Professor OCHIAI Hideki | KDDI Foundation Research Award (2014.3.28) | KDDI Foundation |
| Associate Professor MARUO Shoji | Best Paper Award in 2013 International Symposium on Micro-NanoMechatronics and Human Science(MHS2013) (2013.11.13) | IEEE Robotics and Automation Society |
| Associate Professor FUKUDA Junji | Encouragement Award of the Society for Biotechnology, Japan (Terui Award) (2013.9.18) | The Society for Biotechnology, Japan |
| Professor KAWAMURA Atsuo | IEEJ Industry Applications Society Technical Achievement Award (2013.8.29) | The Institute of Electrical Engineers of Japan |
| Professor KOIZUMI Jun-ichi | Japan Society for Engineering Education Engineering Education Award (2013.8.25) | Japanese Society for Engineering Education |
| PED management ※ | Japan Society for Engineering Education Engineering Education Award (2013.8.25) | Japanese Society for Engineering Education |
| Professor FUKUTOMI Hiroshi | Best Paper Award (scientific paper) (2013.6.6) | The Japan Society for Heat Treatment |
| Technical Specialist OKAYASU Kazuto | Best Paper Award (scientific paper) (2013.6.6) | The Japan Society for Heat Treatment |
| Associate Professor UBUKATA Takashi | SPSJ Award for the Outstanding Paper in Polymer Journal sponsored by ZEON (2013.5.30) | The Society of Polymer Science, Japan |
| Professor KOIZUMI Jun-ichi | Kanto Society for Engineering Education Association Award (2013.5.28) | Kanto Society for Engineering Education |
| PED management ※ | Kanto Society for Engineering Education Association Award (2013.5.28) | Kanto Society for Engineering Education |
| Professor ARAI Hiroyuki | Best Tutorial Paper Award (2013.5.14) | The Institute of Electronics, Information and Communication Engineers |
| Associate Professor ICHIYANAGI Yuko | New Product & Novel Technology Award (2013.4.18) | Japan Society of Powder and Powder Metallurgy |

※ KOIZUMI Jun-ichi, OKAZAKI Shinji, ITO Koichiro, YOKOYAMA Takashi, MITSUHASHI Kaoru, ITO Daisuke, DAITOKU Tadafumi, TANAKA Mikako, IWASAKI Maiko, MORIMOTO shiori

2013-14 Highlights

Special lecture by Nobel Prize winner Professor Dr. Peter Grünberg

A special lecture by Nobel Prize winner Professor Dr. Peter Grünberg was organized and administered by the 3rd interdisciplinary project on “Innovative devices and materials technology for nanomedicine and living body analysis” on 20th December, 2013 at Media Hall in the Central Library of the University. The lecture title was “The Einstein-Podolsky-Rosen paradox and its solution using the phenomenon of entanglement”. Professor Grünberg was awarded the 2007 Nobel Prize in Physics for the discovery of giant magnetoresistance (GMR) and for the creation of innovative spin-electronics and devices.

While the professor is known as the “Father of Hard Disk Drives,” however, he is interested in biomedical applications and therefore developed interest in our research results.

Even though he stayed in Japan for only 10 days, he was kind enough to visit our university in Yokohama, which was his third visit of this kind.

The concept of the EPR paradox in the lecture title was a difficult issue concerning quantum entanglement. However, having accidentally deleted most of the presentation files in the morning, he gave a substitute lecture on “energy efficiency” which turned out to be the kind of lecture easily understandable not just for experts but for a general audience.



After the lecture, the professor answered the questions posed by the students with utmost care and consideration, adding further comment and suggestions. He also joined the photo session afterwards, with students and willingly gave his autographs. He left with us the impressive statement that “The research of today shapes the life of tomorrow.”

Grants-in-aid for scientific research and external funds from government-affiliated agencies received by professors of the Faculty of Engineering at Yokohama National University (YNU) in FY2013 (More than 5 million yen)

This table mainly lists large amount of external funds (more than 5 million yen) from government-affiliated agencies including grants-in-aid for scientific research. The Faculty of Engineering also received massive funds for various studies which required less than 5 million. In addition, many companies and organizations contributed to the Faculty of Engineering through the provisions of grants for cooperative or commissioned research and donations.

You can access Academic Research Staff to see the details. To check the amount of money received according to each item, please refer to Page 35. Further information regarding the professors of the Faculty of Engineering as well as their research fields and profiles is available from Academic Research Staff. Please visit the Website of Yokohama National University (<http://www.ynu.ac.jp/>).

2013 Ministry of Education, Culture, Sports, Science and Technology Japan Society for the Promotion of Science Grants - Aid for Scientific Research

(More than 5 million yen)

| Research Item | Research Theme | Representative | Amount of Money Awarded (Yen) | Study Period |
|---|--|------------------------------|-------------------------------|--------------|
| Grant-in-Aid for Scientific Research(S) | Study on sub- μ W microprocessors using adiabatic single-flux- quantum circuits | Professor YOSHIKAWA Nobuyuki | 39,520 | 2010 ~ 2013 |
| Grant-in-Aid for Scientific Research(S) | Super-sensitive bio-marker sensors using ultimate light localization in nano-slot nanolasers | Professor BABA Toshihiko | 45,110 | 2012 ~ 2016 |
| Grant-in-Aid for Scientific Research(A) | An enhanced method of evaluation for durability of marine structures | Professor SUMI Yoichi | 8,710 | 2010 ~ 2013 |
| Grant-in-Aid for Scientific Research(A) | Single-shot broadband real-time imaging spectroscopy using an optical device with micro-step structure | Professor TAKEDA Jun | 8,320 | 2011 ~ 2014 |
| Grant-in-Aid for Scientific Research(A) | Novel features by the interaction of dust particles in a complex plasma | Professor ISHIHARA Osamu | 11,700 | 2011 ~ 2013 |
| Grant-in-Aid for Scientific Research(A) | Creation of soft materials using ionic liquids | Professor WATANABE Masayoshi | 15,470 | 2011 ~ 2013 |
| Grant-in-Aid for Scientific Research(A) | Development of core technologies for human-friendly assistance systems using spiral motors | Professor FUJIMOTO Yasutaka | 10,270 | 2012 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Study of fundamental processes of biomolecule recognition based on surface structure control of solid substrates | Professor OGINO Toshio | 5,330 | 2012 ~ 2014 |

| Research Item | Research Theme | Representative | Amount of Money Awarded (Yen) | Study Period |
|--|--|---|-------------------------------|--------------|
| Grant-in-Aid for Scientific Research(B) | Microring-enhanced Mach-Zehnder optical switch low power consumption and multiwavelength operation | Associate Professor ARAKAWA Taro | 5,980 | 2012 ~ 2014 |
| Grant-in-Aid for Scientific Research(B) | Surface curvature control by iterative geometric interpolation algorithm and its application to isogeometric analysis | Professor MAEKAWA Takashi | 13,260 | 2012 ~ 2014 |
| Grant-in-Aid for Scientific Research(B) | Dynamics and functions of aligned biomolecules controlled by an electric potential at solid-liquid interface | Professor TANAKA Masatoshi | 12,610 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Magnetic hyperthermia and development of superparamagnetic nanoparticles following the Néel relaxation system | Associate Professor ICHIYANAGI Yuko | 11,830 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Study of infrared emission of liquid xenon scintillators | Associate Professor NAKAMURA Shogo | 16,510 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Improvement of tribological properties of ceramics by shot peening and crack healing | Professor TAKAHASHI Koji | 10,660 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Joint optimization of technologies in multiple layers to realize dependable controlling communications for medicine, transportation, disaster prevention and energy infrastructure | Professor KOHNO Ryuji | 8,710 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Creation of advanced distributed intelligence infrastructure by smart system of systems approach | Professor HAMAGAMI Tomoki | 5,460 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Development and release of a package program; All-electron mixed basis approach | Professor OHNO Kaoru | 11,570 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Elucidation of the flow-induced single crystallization of colloids and its applications | Associate Professor KANAI Toshimitsu | 10,530 | 2013 ~ 2015 |
| Grant-in-Aid for Scientific Research(B) | Engineering three-dimensional tissues using electrochemistry | Associate Professor FUKUDA Junji | 6,370 | 2013 ~ 2015 |
| Grant-in-Aid for Young Scientists(A) | Research and development of multi-degrees-of-freedom haptic forceps for surgical simulators | Associate Professor SHIMONO Tomoyuki | 11,440 | 2011 ~ 2013 |
| Grant-in-Aid for Young Scientists(A) | Design of high data rate and energy-efficient advanced communication systems | Associate Professor OCHIAI Hideki | 7,280 | 2011 ~ 2014 |
| Grant-in-Aid for Scientific Research on Innovative Areas | Structure function relationship of photo-activated intermediates of photo-receptor membrane proteins as revealed by photo-irradiation solid-state NMR | Professor NAITO Akira | 5,070 | 2012 ~ 2013 |
| Grant-in-Aid for Scientific Research on Innovative Areas | Electron-phonon dynamics and nano-scale phonon wavepackets in graphene-related materials | Professor TAKEDA Jun | 5,720 | 2013 ~ 2014 |
| 計 | | | 287,430 | |

Trust study, collaborative investigation, furtherance business with 2013 Ministry of Education, Culture, Sports, Science and Technology, the government bank
(More than 5 million yen)

| Division | Research Title | Representative | Amount of Money Awarded (Yen) | Study Period |
|---|--|-------------------------------------|-------------------------------|--------------|
| Japan Science and Technology Agency | Optimization of ionic liquid electrolytes and high-capacity cathodes for Li-Sulfur batteries | Professor WATANABE Masayoshi | 95,737 | 2012 ~ 2015 |
| | Development of novel wrought aluminum alloys concurrently strengthened by ultrafine-grained and precipitation hardenings and establishment of guidelines for innovative alloy designing | Professor HIROSAWA Shoichi | 14,972 | 2013 ~ 2014 |
| | A study on runtime dependability with Security Weaver and P-Script | Associate Professor KURAMITSU Kimio | 137,495 | 2012 ~ 2014 |
| | Development of novel ceramics possessing self healing functions for turbine blades | Associate Professor NAKAO Wataru | 20,800 | 2012 ~ 2015 |
| | Microdevices designed for biofilm analysis | Associate Professor FUKUDA Junji | 9,737 | 2013 ~ 2015 |
| | Research and development of a dependable wireless medical network using highly reliable body area networks | Professor KOHNO Ryuji | 5,500 | 2013 ~ 2014 |
| | On the high performance of power batteries as electrochemical engines of new energy vehicles | Professor UTAKA Yoshio | 55,684 | 2013 ~ 2016 |
| | Next-generation of organic hydride technology for the increase of renewable energy utilization | Professor MITSUSHIMA Shigenori | 64,713 | 2013 ~ 2015 |
| | Construction of foundations for smart social service systems, creating secure and safe communities through the advancement of emergency medical care | Professor HAMAGAMI Tomoki | 7,304 | 2013 ~ 2014 |
| | Understanding and boundary structure optimization of coupled phenomena of heat and mass transport and electrochemical reaction by micro sensors and multi-scale numerical analysis | Associate Professor ARAKI Takuto | 17,940 | 2013 ~ 2015 |
| Wave radar system for small ships with individual wave prediction and warning function of dangerous waves | Associate Professor HIRAKAWA Yoshiaki | 6,500 | 2013 ~ 2014 | |
| The University of Tokyo | Research on photonics-electronics convergent system technology | Professor BABA Toshihiko | 15,500 | 2010 ~ 2014 |
| New Energy and Industrial Technology Development Organization | Microdevices for culturing microbes and their uses for saving energy in wastewater treatment plants | Associate Professor FUKUDA Junji | 14,950 | 2011 ~ 2015 |
| | Strategic development of PEFC technologies for practical application/ Non-precious metal oxide based catalyst for PEFC | Professor OTA Ken-ichiro | 88,829 | 2010 ~ 2015 |
| | Basic technology development of green & sustainable chemical processes/ Basic technology development of innovative catalytic naphtha cracking processes/ Development of innovative naphtha cracking processes using high-performance zeolite catalysts | Professor KUBOTA Yoshihiro | 15,000 | 2009 ~ 2014 |
| | Lithium-air batteries using solvate ionic liquids | Professor WATANABE Masayoshi | 29,575 | 2012 ~ 2016 |
| National Institute of Information and Communications Technology | Research on innovative technologies of amplification, connection and transmission for SDM | Professor KOKUBUN Yasuo | 6,828 | 2011 ~ 2016 |
| | R&D of innovative optical fiber and communication technology | Professor KOKUBUN Yasuo | 5,775 | 2013 ~ 2018 |
| Minimal Fab Technology Research Association | Development of minimal CVD reactor using concentrated infrared light heater | Professor HABUKA Hitoshi | 5,250 | 2013 ~ 2014 |
| National Institute of Advanced Industrial Science and Technology | Technology development for the storage and transport of renewable energy/ Precise measurement of wind for hydrogen energy | Professor OTA Ken-ichiro | 14,228 | 2013 ~ 2014 |
| 計 | | | 632,317 | |

Highlight of International Exchange, Public contributions

Comprehensive Alliance for Mutual Collaboration in the Research Field of Photoresponsive Molecular Materials

In March 2011, the title Alliance among Yokohama National University (YNU), Aoyama Gakuin University (AGU) and Nara Institute of Science and Technology (NAIST) was agreed upon by their respective Presidents. The research organization participating in this Three-University Alliance at YNU is “Ray-Lite: Research Association in Yokohama for Light-Triggered Events” which is also one of the YNU Research Centers. The Three-University Alliance in turn has been assigned as the core of the Japanese organization for research on photo-responsive materials, “JANET PRESS: Japan Network for Photo-responsive Substances,” which is composed of 25 laboratories from 21 universities; Ray-Lite at YNU is the headquarters of JANET PRESS. JANET PRESS is itself one of the members of “PHENICS: Photo-switchable Organic Molecular Systems and Devices” which was founded by CNRS, France in 2008. PHENICS includes similar research conglomerates to JANET PRESS from Japan, France, China, Russia, and Germany. The aim of PHENICS is to activate the international research in this area by cooperative research and exchange of research information through symposia. Thus, Ray-Lite in YNU is the keystone of international research in this area in Japan through the connection of Ray-Lite – Three-University Alliance – JANET PRESS – PHENICS.

Activities concerning Ray-Lite and Three-University Alliance in the 2013 academic year are listed below, classified according to the hierarchies described above.

1. Ray-Lite

* Ray-Lite members applied cooperatively for several Kaken-hi research funds from JSPS or MEXT Japan, functioning as a funding group and polishing up their application topics.

* Ray-Lite members published a work of collaborative



Poster session at the Japan-France Bilateral Symposium.



Participants in ISOP2013/PHENICS Symposia.

research within the framework of PHENICS in an international journal (F. G. Erko, J. Berthet, H. Ogawa, Y. Yokoyama, S. Delbaere, *Tetrahedron Lett.*, **2013**, 54, 6366-6369 (IF 2.397).)

2. Three-University Alliance

* Two international symposia (“Japan-France Bilateral Symposium”, April 2013 and “International Symposium on Photoresponsive Materials 2014”, February 2014) were held at AGU.

3. JANET PRESS

* An application for Kaken-hi “Scientific Research on Innovative Areas” was submitted with Professor Miyasaka, Osaka University, a member of JANET PRESS, as the field representative and representatives from each member of the Three-University Alliance involved in planning. This application has been accepted for the 2014 fiscal year, and five years of planned activity have begun..

* An application for holding a Technical Symposium “Design of Innovative Photochromic Applications” at the International Chemical Congress of Pacific Basin Societies (PACIFICHEM 2015) to be held in Honolulu, Hawaii in December 2015 has been submitted with Professor Abe (AGU) as the representative. Its acceptance was notified in July 2014.

4. PHENICS

* The PHENICS International Symposium 8th Edition was held in Berlin in September 2013 as the post-symposium of the 7th International Symposium of Photochromism (ISOP2013).

* An application for the JSPS Core-to-Core Program was submitted in October 2013, based on the activities of JANET PRESS and PHENICS, for which Professor Yokoyama, YNU, acted as the representative.

Joint research through the framework agreement with Komatsu Ltd.

Since signing in September 2004 a comprehensive agreement with Komatsu Ltd., aiming at next-generation construction machinery, we have been conducting joint research in the two major areas of ICT (information and communications technology) and basic components. Managers in charge from both Yokohama National University and Komatsu Ltd., perform project management, including topic selection. Komatsu Ltd. and Yokohama National University are

actively performing joint research, sharing information closely. With interim reports presented to the collaboration committee twice a year, evaluations from both Komatsu Ltd. and Yokohama National University are put to full advantage in reviews of the research plans. Industry-university cooperation is a part of the University's social contribution and has also led to the provision of educational opportunities to students and the discovery of new research topics.

Unmanned operation of ultra-large dump trucks through information and communication technology



Kyosan Advanced Technology Joint Research Chair 2nd year

Since April 2013, Kyosan Electric Mfg. Co., Ltd. has sponsored the three-year Kyosan Advanced Technology Joint Research Chair within the Cooperative Research and Development Center, now in its second year. The mission of the Chair is to conduct advanced joint research on film production in various devices through manufacturing equipment such as semiconductor processing, using plasma technology. Plasma discharges can become unstable depending on manufacturing conditions, leading to decreased product quality. Stable plasma discharge is mandatory for high quality film production. Thus, advanced

technology is required to achieve stable discharge regardless of changing conditions in the manufacturing process. This control technique will be investigated by the Chair, Professor Itsuo Yuzurihara, who conducts various research on this subject with professors in the department of Electrical and Computer Engineering. In particular, he is carrying out experiments at the Center on digital control of DC-DC power supplies in order to control plasma discharge, and has filed a patent application on the topic. He also kindly teaches an undergraduate lecture: Power Electronics.

Open Lectures

The Faculty of Engineering, Yokohama National University (YNU), held public lectures in AY2013 for a wide range of people including citizens, high school students, government officials, professional engineers,

and technical specialists.

The following table lists details of the lectures provided by professors of YNU Faculty of Engineering.

| Lecture name | Date | Intended audience | Number of participants |
|---|--|---|------------------------|
| Basics of cast iron for users | Thursday, July 4 – Friday, July 5, 2013 | People in general, engineers, and undergraduate and postgraduate students | 93 |
| The 7th Systems Design for Ocean-space Cup, Fin-propulsion Ship Competition | Lecture: Monday, July 15, 2013 (public holiday in Japan) Competition: Saturday, August 24, 2013 | Mainly high school students (People in general were allowed to attend the lecture but participate in the completion as an observer only.) | 120 |
| Instrumental analysis for practical use (1) Instrumental analysis of the organic molecules –Selection guide and how-to information of the instruments | Thursday, August 22 – Friday, August 23, 2013 | People in general, engineers, and undergraduate and postgraduate students | 2 |
| -Basic course of classroom lectures and experiments- Material degradation and Countermeasure technique | Monday, September 2 – Friday, September 6, 2013 | People in general and engineers | 32 |
| Instrumental analysis for practical use (2) Observation and analysis of the solid materials using electron beam | Thursday, September 3, 2013 | People in general, engineers, and undergraduate and postgraduate students | 9 |
| Basis and practice for development and application of ceramic materials | Thursday, September 12 – Friday, September 13, 2013 | People in general and engineers | 2 |
| Advanced experimental course for engineers (I) -Measurement and evaluation of Corrosion- | Thursday, January 23 – Friday, January 24, 2014 | People in general and engineers | 10 |
| Advanced experimental course for engineers (II) -Corrosion and countermeasure technology of stainless steel- | Thursday, February 13 – Friday, February 14, 2014 | People in general and engineers | 4 |

Programs for High School Students



Students receiving a mock lecture



Explanation of departments

Open Campus 2013

Open campus 2013 was held on Friday, August 2 and Thursday, August 3.

Approximately 18,000 people visited Yokohama National University (YNU) for the two-day open campus, of which about 9,000 people participated in the event hosted by the College of Engineering Science. The number of participants increased from the previous year.

Open campus is a student recruitment event. High

school students wishing to study at YNU can visit and view the campus directly with their parents to experience campus life. We provide mock lectures and a campus tour to explain YNU facilities such as a library.

The College of Engineering Science introduced the departments and some programs, explained the entrance tests, and provided several activities such as mock lectures, a tour of laboratories and related facilities, and an individual consultation.

Theme of mock lectures

| Department | EP | Theme | Professor | Department |
|---|---|---|---------------------------------------|--|
| Department of Mechanical Engineering and Materials Science | Mechanical Engineering | An introduction to fundamentals of machine design -simple gear design and complicated electric vehicle design - | Professor SATO Yasukazu | Faculty of Engineering |
| | Materials Science and Engineering | Why is material engineering needed now? | Professor FUKUTOMI Hiroshi | Faculty of Engineering |
| Department of Chemistry, Chemical Engineering and Life Science | Chemistry Chemistry Applications Life Science | Study for safety assessment of chemicals using cell lines | Professor ITAGAKI Hiroshi | Faculty of Engineering |
| Department of Architecture, Infrastructure, Ocean Engineering and Ecosystem Science | Architecture and Building Science | Environment and architecture | Associate Professor OHNO Satoshi | Faculty of Urban Innovation |
| | Civil Engineering | Towards sustainable urban transport | Professor NAKAMURA Fumihiko | Faculty of Urban Innovation |
| | | Why traffic congestion happens? | Associate Professor TANAKA Shinji | Faculty of Urban Innovation |
| | Systems Design for Ocean-Space | How to convert the potential ocean energy to available energy | Associate Professor MURAI Motohiko | Faculty of Environment and Information Science |
| | | The sky, the space and the robotics | Associate Professor HIGUCHI Takehiro | Faculty of Environment and Information Science |
| | Ecology, Earth and Environmental Science | Living Soil and its Functioning | Professor KANEKO Nobuhiro | Faculty of Environment and Information Science |
| Department of Mathematics, Physics, Electrical Engineering and Computer Science | Mathematical Science | Mathematics for coloring maps | Associate Professor NAKAMOTO Atsuhiko | Faculty of Environment and Information Science |
| | | Mathematical Science is useful, isn't it? | Professor NUKATA Junji | Faculty of Environment and Information Science |
| | Physics and Applied Physics | Galileo's physical world - science impossible - | Professor YAMAMOTO Isao | Faculty of Engineering |
| | Electrical and Computer Engineering | How to make "Intelligent Systems" -Artificial intelligence and machine learning challenges. | Professor HAMAGAMI Tomoki | Faculty of Engineering |
| | Computer Science and Engineering | Invitation to the World of Cryptography - What's Cryptography in the Past, Present, and Future - | Associate Professor SHIKATA Junji | Faculty of Environment and Information Science |
| | | Excel+ α = human language? -- Doing linguistics in an engineering science department | Associate Professor FUJII Tomohiro | Faculty of Environment and Information Science |

Information sessions and mock lectures at high schools

Yokohama National University (YNU) conducted information sessions and mock lectures at 38 high schools in AY2013. The following table lists details of the high schools visited by professors of the College of Engineering Science.

| Name of high school | Date | Type of participants | Number of participants |
|---|-------------|----------------------|------------------------|
| Yokohama City Municipal Yokohama Science Frontier High School | April 23 | 2nd grader | 36 |
| Kanagawa Prefectural Kibogaoka Senior High School | July 12 | 2nd grader | 36 |
| Kamakura Gakuen High School | July 16 | 2nd grader | 46 |
| Kanagawa Prefectural Zama Senior High School | November 13 | 1st and 2nd grader | 24 |
| Kanagawa Prefectural Koryo High School | December 19 | 2nd grader | 19 |
| Tochigi Prefectural Tochigi Upper Secondary School | March 17 | 2nd grader | 45 |

Forty-nine schools visited Yokohama National University (YNU) in AY2013, of which the following high schools provided explanations and lectures by professors of the College of Engineering Science.

| Name of high school | Date | Types of visitors | Number of participants |
|--|------------|-------------------|------------------------|
| Kamakura Gakuen High School | June 21 | 1st grader | 40 |
| Kanagawa Prefectural Koryo High School | July 25 | Students | 20 |
| Kanagawa Prefectural Yokohama Suiran High School | October 22 | 1st grader | 10 |
| Shizuoka Prefectural Fuji Senior High School | October 30 | 2nd grader | 80 |

Academic Exchange Agreement with the University of Dhaka (Bangladesh)

On December 17, 2013, Professor Masayoshi Watanabe of the Faculty of Engineering visited the University of Dhaka (Bangladesh) as a representative of President of YNU, Professor Kunio Suzuki. Prof. Watanabe and the President (Vice Chancellor) of the University of Dhaka, Professor Siddique, held a signing ceremony for the academic exchange agreement between the two universities.



The Faculty of Engineering at YNU and Faculty of Science at the University of Dhaka approved an academic exchange between faculties as well as a student exchange agreement in March 2005. Since then, the two faculties have developed both academic and student exchanges frequently and successfully. Dean of the Faculty of Science, Professor Mollah, and

Professor Susan of the Department of Chemistry made a courtesy visit to YNU on October 2013 to discuss further development of the academic agreement which had been signed between faculties of both universities. YNU agreed to sign a new arrangement between the two universities to hold a signing ceremony at that opportunity.

The University of Dhaka is a national university and one of the most prestigious universities in Bangladesh. It was established in 1921, during the era of British occupation. It is also the largest university in the country, with approximately 38,000 students, 3,400 teaching & administrative staff members, 71 departments in 12 faculties, 10 institutes, and 38 research centers.

Many people are friendly with Japanese colleagues because many members of the teaching staff have acquired academic degrees from Japanese universities, and also because Japan is the biggest ODA distributor to Bangladesh. The aforementioned Professor Susan was also a student of the Graduate School of Engineering, YNU. Many graduate students desire to earn an academic degree at Japanese universities. Development and administration of exchanges in many layers of the two university organizations is desirable in order to encourage enrollment of excellent students to YNU.



Inter-University Relationship between YNU and Queen's University

Queen's University in Kingston is one of the oldest, most famous and highest-level universities in Canada. Kingston is located in Eastern Ontario, where the St. Lawrence River flows out of Lake Ontario, and it served as the first capital of Canada from 1841 to 1844. The international collaboration between YNU and Queen's began in 2006. Associate Professor Kasai of the Graduate School of Environment and Information Science at YNU visited Professor Clapham of the Faculty of Engineering & Applied Science at Queen's University for 9 months through the Advanced International Education and Research Support Program by MEXT.

In 2010, Professor Mitsushima of the Graduate School of Engineering at YNU started a scientific journal of "Electrocatalyst" with Professor Jerkiewicz of the Faculty of Arts & Science at Queen's, who is chief editor of that journal. Professor Mitsushima, Professor Jerkiewicz and the other editorial board members also

organized two international conferences, "International Symposium on Electrocatalysis: New Concepts and Approaches" at Irsee, Germany and Maragogi, Brazil in 2010 and 2012, respectively, and will hold additional in Whistler, Canada and Kanagawa, Japan in 2014 and 2016, respectively.

In 2012, Green Material Innovation (GMI) at YNU applied for "Cultivation of Young Scientists with Global Standards to actualize "Green Materials Innovation" in Strategic Young Researcher Oversea Visits Program for Accelerating Brain Circulation by Japan Society for the Promotion of Science. After the adoption of this project, Dean Ishihara of the Graduate School of Engineering, and Professor Mitsushima visited Queen's, and started to discuss the inter-university agreement in March 2013.

Since June 2013, Associate Professor Matsuzawa of the Graduate School of Engineering at YNU visited Queen's as a visiting researcher of the program. He studied non-precious oxide-based electrocatalysts for cathodes in polymer electrolyte fuel cells with Prof. Jerkiewicz.

On September 25, 2013, YNU and Queen's finally concluded the collaborative relationship agreement.

After establishing this agreement, Vice-Principal (Research) Liss of Queen's University paid a courtesy visit to YNU on October 10, 2013. He discussed collaboration with President Suzuki and Vice President Yamada, along with other professors. He also spoke with Dean Kawamura of the Graduate School of Engineering.

We are very proud to establish this partnership with Queen's University. We hope to strengthen this relationship even more in the future.



Campus of Queen's University

Vice-Principal (Research) Liss of Queen's University paid a courtesy visit to the YNU (President Suzuki (front, right) and Vice-Principal (Research) Liss (front, left)).



New Faculty-Level MoU between the University of Padova and YNU

The Department of Engineering and Management at the University of Padova (Vicenza, Italy), and the Graduate School of Engineering and Faculty of Engineering at Yokohama National University, agreed to establish a new faculty-level “Memorandum of Understanding” (MoU) on February 17, 2014. The main purpose of this memorandum is the joint academic cooperation through one or more of the following activities;

- (A) Scientific research**
- (B) Educational activity**
- (C) Exchange of academic staff and researchers**
- (D) Exchange of graduate students**
- (E) Participation in joint seminars and collaborative academic meetings**

Since 2012, international collaboration between these two faculties has become more frequent, especially in the fields of motion control, mechatronics, and robotics. In February 2012 and October 2013, Professor Roberto Oboe came to Yokohama and gave special lectures. Meanwhile, Professor Atsuo Kawamura, Professor Yasutaka Fujimoto and Professor Tomoyuki Shimono visited Vicenza and held a special joint meeting in March 2013. The conclusion of this MoU is the fruit of these continuous collaborations.

On March 13, 2014, Professor Roberto Oboe once again came to the Faculty of Engineering, YNU. In the photograph, our dean, Professor Kawamura and Professor Oboe exchanged the original documents of the MoU signed by Professor Giuseppe Zaccaria (Rector, The University of Padova) and Professor Kawamura. Thanks to the conclusion of this MoU, the collaboration between these two faculties will be more actively promoted.



Professor Atsuo Kawamura and Professor Roberto Oboe, exchanging the signed MoU

Report on Cultivation of Young Scientists with Global Standards to Actualize “Green Materials Innovation”

The program, Cultivation of Young Scientists with Global Standard to Actualize “Strategic Young Researcher Overseas Visit Program for Accelerating Brain Circulation” whose funding agency is Japan Society for the Promotion of Science (JSPS) was founded in September, 2011. Since October of that year, 6 young professors and 1 PhD student have been dispatched to the collaborative overseas institutions shown in Fig. 1.

Research topics

The international collaborative research was carried out based on the existing international relations of the collaborators, as well as the group belonging to the research center of “Green Materials Innovation”, Yokohama National University, as shown in Table 1.

Fig. 1 World map of the collaborative overseas institutions

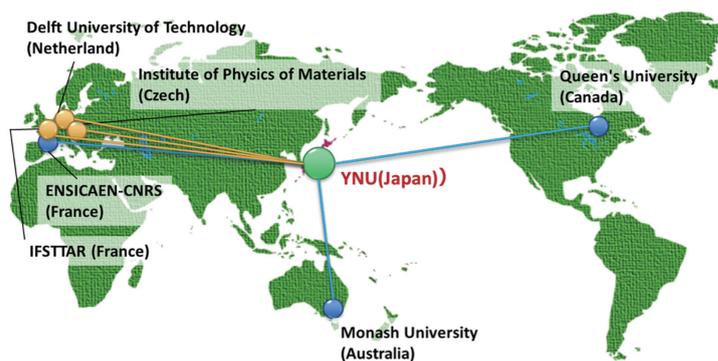


Table 1 List of Research topics of this program

| Division | Collaborator | Visiting Researcher | Research Topic |
|--------------------|---|--|--|
| Advanced Ceramic | Dr. Wim G. Sloof (Delft University of Technology, Netherland) | Wataru NAKAO (H24,25) Shunsuke YOSHIOKA (H26) | Development of Advanced self-healing agent for structural ceramics system |
| Advanced Concrete | Dr. Nicolas Roussel (IFSTTAR, France) | Akira HOSODA | Development of new testing methodology for concrete degradation |
| Advanced Metal | Prof. Ivo Dlouhy (Institute of Physics of Materials, Czech) | Makoto HASEGAWA | Mechanical investigations of TiAl based alloys and thermal barrier coating system |
| Ionic Liquid | Prof. Douglas R. MacFarlane (Monash University, Australia) | Hisashi KOKUBO | Preparation of (P3HT-PEO)n-ion gels and their characterization |
| Electrode Catalyst | Prof. Gregory Jerkiewicz (Queen's University, Canada) | Kouichi MATSUZAWA | Development and characterization of alternative electrode catalysis for fuel cells |
| Porous Catalyst | Prof. Valentin Valtchev (ENSICAN-CNRS, France) | Satoshi INAGAKI | Development and characterization of advanced zeolite having new structure |

These research topics were decided by combining the YNU research seeds and the research seeds of the collaborative institutions. For example, the research topics of the advanced ceramic division is advanced self-healing ceramics, of which basic knowledge is proposed by the YNU research group and developed using the ternary carbide developed by Delft University of Technology.

Dispatch method

The most attractive feature of this program is to divide the overseas dispatch period into three periods; 2012 FY (Research preparation period), 2013FY (Research implementation period) and 2014FY (Research generalization period). The divided dispatch makes it possible to carry out the experiments

Fig. 2 Some photos of the visiting researchers and the collaborators



in both institutions and to hold discussions with the collaborator and coworker at YNU, thereby, accelerating the obtainment of experimental results. Furthermore, the enhancement of intimate international relationships by this program leads to the formation of international agreements (Queen's University and Monash University).

Current state of the organization

Faculty of Engineering

| The number of the Teaching Staff (As of May 1, 2014 (in) as of last year May 1) | | | | | | | | |
|---|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--|
| Research Division | Professor | Associate Professor | Assistant Professor | Assistant Professor | Assistant Professor | Assistant Professor | Research Assistant | ※ Visiting Professor, Visiting Associate Professor |
| Division Of Materials Science and Chemical Engineering | 23 (24) | 26 (26) | 3 (3) | 0 (0) | 7 (7) | 6 (3) | 1 (1) | 6 (5) |
| Division Of Systems Research | 18 (18) | 14 (12) | 3 (3) | 0 (0) | 2 (2) | 5 (5) | 0 (0) | 6 (2) |
| Division of Intelligent Systems Engineering | 24 (25) | 24 (24) | 1 (1) | 0 (0) | 6 (7) | 5 (6) | 3 (3) | 4 (4) |
| Total | 65 (67) | 64 (62) | 7 (7) | 0 (0) | 15 (16) | 16 (14) | 4 (4) | 16 (11) |

※ Cooperative course

Graduate School of Engineering

| The number of the graduate school students (As of May 1, 2014 (in) as of last year May 1) | | |
|--|-----------------------------------|-------------------------------------|
| Department (Course) | The number of the master students | The number of the doctoral students |
| Department of Materials Science and Engineering (Specialization in Advanced Materials Chemistry, Chemical and Energy Engineering) | 216 (203) | 43 (37) |
| Department of Systems Integration (Specialization in Mechanical Engineering, Ocean and Space Engineering, Solid State Materials and Engineering) | 226 (248) | 39 (52) |
| Department of Civil Engineering and Architecture ※ (Specialization in Civil Engineering, Architecture and Building Science) | 2 (3) | 2 (11) |
| Department of Physics, Electrical and Computer Engineering (Specialization in Electrical and Computer Engineering, Physics) | 282 (303) | 62 (52) |
| Total | 872 (909) | 146 (152) |

※ Exists until all students enrolled leaves or graduates.

College of Engineering ※

| The number of the undergraduate (As of May 1, 2014 (in) as of last year May 1) | | |
|--|----------------------------|---|
| Department | The number of the students | The number of the students (Evening Course) |
| Mechanical Engineering and Materials Science | 34 (175) | 3 (6) |
| Materials Science and Chemical Engineering | 19 (185) | 1 (3) |
| Civil Engineering, Architecture and Marine Technology | 20 (160) | |
| Electrical and Computer Engineering | 45 (184) | |
| Physics | 25 (119) | |
| Total | 147 (832) | 4 (9) |

※ Exists until all students enrolled leaves or graduates.

College of Engineering Science

| The number of the undergraduate (As of May 1, 2014 (in) as of last year May 1) | |
|--|----------------------------|
| Department | The number of the students |
| Department of Mechanical Engineering and Materials Science (Mechanical Engineering Program, Materials Science and Engineering Program) | 576 (430) |
| Department of Chemistry, Chemical Engineering and Life Science (Chemistry Program, Chemistry Applications Program, Life Science Program) | 734 (559) |
| Department of Architecture, Infrastructure, Ocean Engineering and Ecosystem Science (Architecture and Building Science Program, Civil Engineering Program, Systems Design For Ocean-Space Program, Ecology, Earth and Environmental Science Program) | 665 (497) |
| Department of Mathematics , Physics, Electrical Engineering and Computer Science (Mathematical Science Program, Physics and Applied Physics Program, Electrical and Computer Engineering Program, Computer Science and Engineering Program) | 1,158 (871) |
| Total | 3,133 (2,357) |

Administrative Staff (As of May 1, 2014 (in) as of last year May 1)

Technical staff that belong 39(39), in Technology Department is 27(27) administrative staff belong to each department and office unit.

Current state of financial

| | Fiscal2013 | | Fiscal2012 | | Fiscal2011 | |
|----------------------------|------------|------------------|------------|------------------|------------|------------------|
| | Number | Amount | Number | Amount | Number | Amount |
| Management Expenses Grants | — | 571,621 | — | 625,214 | — | 733,073 |
| KAKENHI | 108 | 458,154 | 114 | 451,938 | 97 | 400,400 |
| Global-COE | — | — | 1 | 150,444 | 1 | 146,418 |
| Other subsidies | 4 | 19,400 | 7 | 14,428 | 5 | 26,674 |
| Joint Research Funds | 134 | 191,778 | 147 | 218,656 | 152 | 192,721 |
| Contract Research Funds | 46 | 595,992 | 42 | 355,211 | 48 | 444,018 |
| Contributions | 138 | 104,303 | 139 | 116,155 | 145 | 117,479 |
| Total | 430 | 1,941,248 | 450 | 1,932,046 | 448 | 2,060,783 |

Do not include personnel expenses Unit (1,000 JPY)

Member Register

Chief Professor YABUTA Tetsuro

committee Professor ASAMI Masatoshi

committee Professor OHNO Kaoru

committee Professor SUZUKI Kazuya

committee Professor SANADA Kazushi

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