

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.

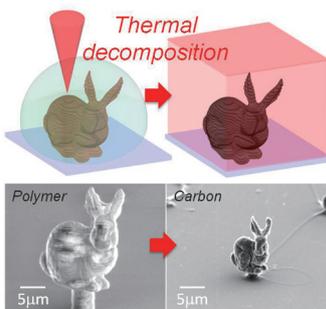


Innovations in Advanced Photoscience and Photofunctional Materials

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.

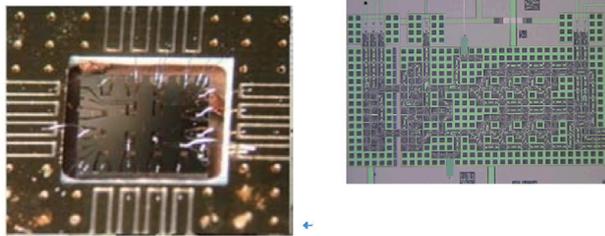
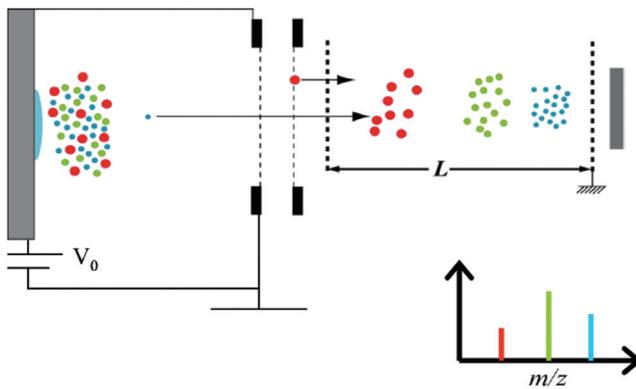
Development of magnetic hyperthermia as a cancer therapy, biosensors, and detectors is now

in progress.

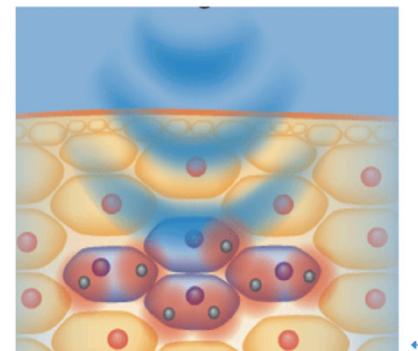
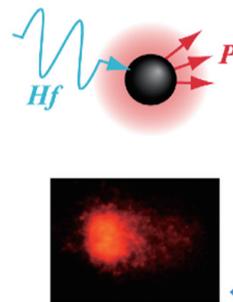
If we could establish a measurement system of the differentiation process, it would contribute to possible prevention of disease and clarification of pathogenesis. We aim to improve the current analysis methods and evaluation techniques to solve problems facing the human race.

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).

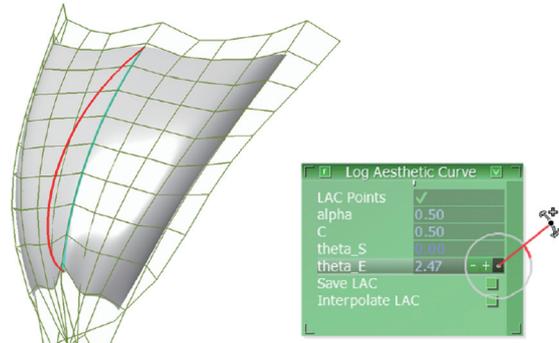


Fig.1 Log-aesthetic curves

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).

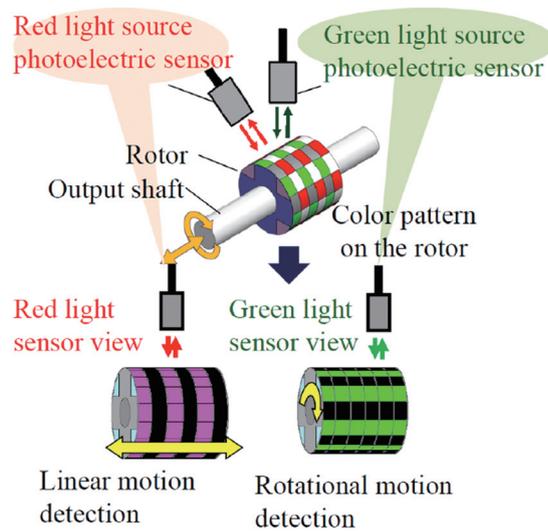


Fig.2 Noncontact linear and rotational motion sensor

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).

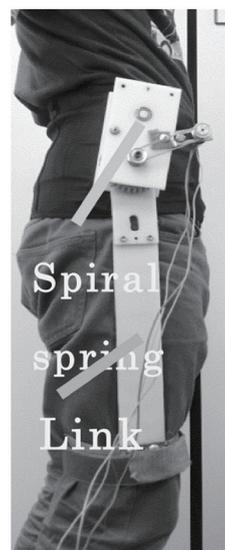


Fig.3 Walking assistance device

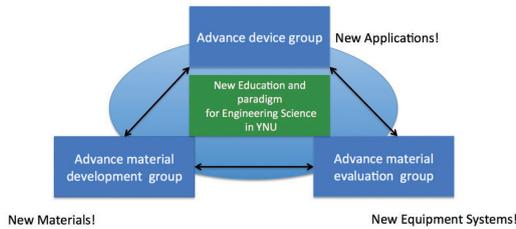
Advanced Science and Technology for Magnetism and Superconductivity in YNU

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

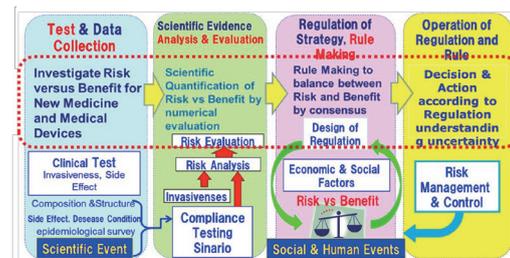
Technologies Based on Innovative Integration between Medicine and Engineering / Social and National Sciences -- International Standardization, Regulation Making, and Global Business Promotion Based on Collaboration among Industry, Government, and Academia Including Inter-University Cooperation

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	