

Activity Report for FY2014

Because science technologies which create new leading industries are becoming increasingly important, one of the considerable subjects is promoting the development of fundamental technology in the field of biomedical engineering measurement. The Nakatani Foundation for Advancement of Measuring Technologies in Biomedical Engineering, since its establishment in 1984, has carried out grant programs to encourage the development of leading technologies and technology exchanges in the field of measuring technologies. In FY2014, commemorating the 30th anniversary of its establishment, we revised the grant programs by adding an education promotion program to foster and support researchers, so that we could implement more fulfilling activities, and carried out the programs described below.

Also, as part of the 30th anniversary programs, we held a commemorative special lecture (by Mr. Yoichi Haga, Professor at Tohoku University) and a celebration party along with a Nakatani Award presentation ceremony on March 2015. A 30th Anniversary Commemorative Booklet was issued as well.

I. Grant Program for the Development of Technology

Biomedical engineering measuring technologies are basic technologies; therefore, it is quite important to promote the development of its leading technologies. The grant program for the development of technology in the field of biomedical engineering measuring technologies is our core project and we focused on this activity this year as well. In FY2014, we initiated a Grant Program for Special Research to grant subsidies of up to 30 million yen over two years for the research which is expected to produce outstanding results and lead to practical uses.

1. Invitation for Applications

Biomedical engineering measuring technologies cover a broad range of fields. They overlap the boundaries of science/engineering and medicine/biology as the field of technology development expected to play an important role in building a healthy and hopeful world. We invited applications from universities and equivalent research institutes for the research subjects for the grant, "Biomedical Engineering Measuring Technologies Related to the Living Body," for which the social need has been growing as an academic research subject. The invitation was given in the same way as in the preceding year: by sending out letters and posting on our website to reach as many people as possible.

[Invitation] Initiated July 10, 2014 ⇒ Invitation letters mailed to 281 locations and posted on our website

[Due date for applications]

Grant for Special Research: Closed on September 16, 2014; 24 applications received

Grant for Development and Encouragement of Research: Closed on September 30, 2014;

55 applications for the Development Research category received

18 applications for the Encouragement of Research category received

2. Screening

Members of the selection committee (consisting of Mr. Kajiya, Chairperson, and 12 other members), which is set up in the Nakatani Foundation for Advancement of Measuring Technologies in Biomedical Engineering, carefully screened 97 applications from universities, etc.

and chose 27 cases (17 for development of research, 4 for encouragement of research, and 6 for special research) that were expected to contribute to the development of leading technologies in the field of biomedical engineering measuring technologies.

[Screening procedures]

- Primary screening (paper)
 - Grant for Special Research: September 19 to October 10, 2014
 - Grant for Development and Encouragement of Research: October 7 to November 4, 2014
- Secondary screening (paper)
 - Grant for Special Research: October 16 to November 7, 2014
 - Grant for Development and Encouragement of Research: November 11 to December 5, 2014
- Third screening (interview)
 - Grant for Special Research: December 3, 2014
- Final screening: At the selection committee meeting on December 13, 2014

3. Ceremony to Present the Grant for Development of Technology

A ceremony was held on March 12, 2015, at the Imperial Hotel to present the grants to the researchers who had won the 31st grant program for the development of technology and to hear their research presentations. The grant for the development of technology, amounting to 117.16 million yen in total (FY2014), was presented to the following 27 researchers:

The recipients of the 31st (FY2014) grant program for development and research of technology (honorific titles omitted /not listed in any particular order)

[Grants for Development and Research of Technology]

Grants for Development Research

Unit: 10,000 Japanese yen

Name	Facility, Post	Research Title	Amount of Grant
Masahiro Ono	Associate Professor, Department of Patho-Functional Bioanalysis, Graduate School of Pharmaceutical Sciences, Kyoto University	Development of an amyloid SPECT imaging method for the diagnosis and treatment of Alzheimer's disease	300
Tatsuro Goda	Assistant Professor, Department of Bioelectronics, Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University	Measurement of the formation of cell membrane nanopores using cell transistors	300
Masayoshi Nishiyama	Associate Professor, Biophysics, Kyoto University, Hakubi Center	Imaging of the dynamic modulation of protein supramolecular machines working in live cells	300
Ikurou	Lecturer,	Development of measuring	300

Suzuki	Graduate Department of Electronics, Graduate School of Engineering, Tohoku Institute of Technology	technology for on-chip neuron synapse functions intended for an evaluation system of a new drug's efficiency on human-derived nerve cells	
Kiyoshi Yasukawa	Professor, Division of Food Science and Biotechnology, Graduate School of Agriculture, Kyoto University	Development of a new cDNA synthesis technology and its application to microarrays	300
Nicolas Pavillon	Specially Appointed Researcher, Physics, Immunology Frontier Research Center, Osaka University	Development of a cell status measuring method using an unlabeled multimodal microscope	292
Hiroyuki Yoshikawa	Assistant Professor, Precision Science and Technology/Applied Physics, Graduate School of Engineering, Osaka University	Development of a high-sensitivity micro ELISA chip which catches reactions by a light-condensing laser	262
Hiroshi Sekiya	Assistant Professor, Department of Cellular and Molecular Pharmacology, Graduate School of Medicine, The University of Tokyo	Clarification of the mechanism of how an infarct area expands in the brain by fluorometry of extracellular ATP	300
Takashi Azuma	Research Associate Professor, Department of Bioengineering, School of Engineering, The University of Tokyo	Development of a blood-flow measuring technique using ultrasonic computed tomography (CT)	300
Keiichi Torimitsu	Professor, Department of Bioengineering and Robotics, Graduate School of Engineering, Tohoku University	Monitoring of chip-on-clothes biological activity by using flexible silk electrodes	300
Shunrou Fujiwara	Assistant Professor, Neurosurgery Course, Iwate Medical University	Development of an ultimate non-invasive measurement for cerebral blood flow and metabolism using by diffusion-weighted MRI	300
Kosuke Tsukada	Associate Professor, Department of Applied Physics and Physico-Informatics, Faculty of Science and Technology, Keio	Development of a tissue hypoxia imaging sensor and its application to the detection of early cancer, eliminating the use	240

	University	of a contrast medium.	
Yoichi Haga	Professor, Biomechanical Engineering, Graduate School of Biomedical Engineering, Tohoku University	Development of a local glucose tolerance tester using subepidermal microperfusion for the diagnosis of hidden diabetes	300
Makoto Akashi	Professor, Chronobiology, The Research Institute for Time Studies, Yamaguchi University	Development of a long-term real-time monitoring method for gene expression in ambulatory activity	300
Atsushi Kuhara	Associate Professor, Department of Biology/Institute for Integrative Neurobiology, Neuroscience Faculty of Science and Engineering, Konan University	Super-quick auto-tracking of cell population and quantification of its activities by visualization	300
Kazuyuki Minami	Professor, Systems Design and Engineering, Graduate School of Science and Engineering, Yamaguchi University	Development of a distributed cell stimulation matrix device usable for measuring and monitoring the dynamic stimulation response of many single cells	293
Takashi Tateno	Professor, Division of Bioengineering and Bioinformatics, Graduate School of Information Science and Technology, Hokkaido University	Development and evaluation of a closed-loop type nervous system stimulation and activity recording system that suppresses/controls tinnitus	300

Grants for Encouragement of Research

Name	Facility, Post	Research Title	Amount of Grant
Yu Ishima	Assistant Professor, School of Pharmacy, Department of Biopharmaceutics, Kumamoto University	Development of nanoparticles that control tumor environment intended to increase tumor migration of a macromolecular anticancer drug	150
Wataru Yoshida	Assistant Professor, Biotechnology Course, School of Bioscience and Biotechnology, Tokyo University of Technology	Development of a global DNA methylation level measuring method using MBD-luciferase fusion protein	150
Kentaro Otani	Research staff, Department of Regenerative Medicine and Tissue Engineering, Medical	Development of non-invasive molecule imaging by the ultrasonic imaging method	150

	Ultrasonics, National Cerebral and Cardiovascular Center Research Institute	targeting intravascular molecules	
Hideaki Takata	Assistant Professor, Division of Advanced Science and Biotechnology, Graduate School of Engineering, Osaka University	Development of a chromosomal aberration detecting system by visualizing genomic DNA in living cells	140

Grants for Special Research: 2 Years

Name	Facility, Post	Research Title	Amount of Grant
Hiroshi Hibino	Professor, Department of Molecular Physiology, Audiological Physiology/Pharmacology, Graduate School of Medical and Dental Sciences, Nigata University	Development of a measuring foundation of inner-ear pharmacokinetics by making full use of diamond microelectrodes	1,486
Motomu Tanaka	Professor, Biological Physics, Institute for Integrated Cell-Material Sciences, Kyoto University	Establishment of a technique to standardize multi-scale cells for injection therapy of human corneal endothelial cells	1,500
Kazushige Yamana	Professor, Department of Materials Science and Chemistry, Macromolecular Chemistry and Bioorganic Chemistry Research Group, Graduate School of Engineering, University of Hyogo	Development of an ultra-sensitive electrochemical detection method for micro-RNA	1,500
Toyotaka Yada	Lecturer, Applied Medicine, Medical Engineering, Kawasaki Medical School	Evaluation of collateral circulation and coronary subendocardial microvessels prior to coronary artery bypass surgery by using a near-infrared fluorescent microscope	1,500
Matsuhiko Nishizawa	Professor, Department of Bioengineering and Robotics, Graduate School of Engineering, Tohoku University	Development of a high-elasticity epidermal potential measuring system for the analysis of skin cell response to mechanical stimulation	1,500
Hideshi Ishii	Research Professor, Department of Cancer Profiling Discovery, Graduate School of Medicine, Osaka University	Development of a high-resolution technique to measure the methylation modification in a micro-RNA molecule in a single	1,500

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II. Commendation Program (Nakatani Award)

The Nakatani Award, in expectation of dramatic advances in the development of technology in the field of biomedical engineering measuring technologies related to the living body, was instituted to recognize researchers who had achieved the outstanding works. We received 15 applications with recommendations from our open invitation and selected the candidates for the prize after careful screening. We regret that none of the candidates was eligible for the grand prix this year but three researchers won incentive prizes intended to encourage young researchers.

The recipients of the 7th Nakatani Award (honorific titles are omitted /not in particular order):

Grand prix: Not applicable.

Incentive prizes (2.5 million yen each)

Name	Facility, Post	Research Title
Hiroyuki Noji	Professor, Applied Chemistry, School of Engineering, The University of Tokyo	Creation and application of a digital single-molecule counting technology of biomolecules
Hirohide Saito	Professor, Department of Reprogramming Science, Center for iPS Cell Research and Application, Kyoto University	Development of a technology for accurate identification and fate determination of target cells by an artificial RNA switch
Tsuyoshi Sekitani	Professor, Division of Information and Quantum Sciences, The Institute of Scientific and Industrial Research, Osaka University	Development of an extremely soft and thin biological sensor sheet and its application to ultra-low-invasive medical devices

[Invitation] Started from July 10, 2014 ⇒ Invitation letters mailed to 281 locations and posted on our website

[Due date for applications] Closed on October 15, 2014 ⇒ 15 applications with recommendation received

[Screening procedures]

- Primary screening (paper): October 21 to November 28, 2014
- Final screening: At the selection committee meeting on December 13, 2014

III. Grant Program for Technology Exchanges

Along with the development of nanotechnology and biotechnology in recent years, academic areas related to development and research of technology have become increasingly complicated and diverse. Thus it becomes more important to promote technology exchanges among researchers in Japan and overseas. In FY2014, therefore, we added the grant programs for Overseas Training, Overseas Study, and Study in Japan for technology exchanges and subsidized them as follows:

The recipients of the grant program for technology exchanges (Dispatch) in FY2014

Name	Facility, Post	Conference Name	Location	Date
Yunha Kim	Doctoral Program, Department of Electrical Engineering and Information Systems, School of Engineering, The University of Tokyo	The 5th IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics	Sao Paulo, Brazil	August 2014
Kanako Naito	Master's Program, Department of Bioengineering, School of Engineering, The University of Tokyo	The 7th Hamlyn Symposium on Medical Robotics	London, U.K.	July 2014
Shunsuke Toyoda	Specially Appointed Researcher, Integrated Biology Laboratories, Graduate School of Frontier Biosciences, Osaka University	The 9th Forum of the Federation of European Neuroscience Societies (FENS 2014)	Milan, Italy	July 2014
Daisuke Kusakari	Division of Sustainable Energy and Environmental Engineering, Graduate School of Engineering, Osaka University	Photonics West BiOS 2015	California, U.S.A.	February 2015
Tomonori Kaneko	Master's Program, Department of Mechano-Informatics Graduate School of Information Science and Technology, The University of Tokyo	The 28th IEEE International Conference on Micro Electro Mechanical Systems	Estoril, Portugal	January 2015
Ryo Aoki	Master's Program, Department of	The 28th IEEE International Conference on Micro	Estoril, Portugal	January 2015

	Mechano-Informatics, Graduate School of Information Science and Technology, The University of Tokyo	Electro Mechanical Systems		
Chie Suzuki	Master's Program, Department of Mechano-Informatics, Graduate School of Information Science and Technology, The University of Tokyo	The 28th IEEE International Conference on Micro Electro Mechanical Systems	Estoril, Portugal	January 2015
Ryohei Kazama	Master's Program, Department of Mechano-Informatics, Graduate School of Information Science and Technology, The University of Tokyo	The 28th IEEE International Conference on Micro Electro Mechanical Systems	Estoril, Portugal	January 2015

The recipients for the grant program for technology exchanges (Overseas Training) in FY2014

Name	Facility, Post	Research Content	Place of Training	Period
Kozue Watanabe	Applied Physics Labs, Precision Science and Technology/Applied Physics, Graduate School of Engineering, Osaka University	Development of a super-high-resolution Raman microscope	Leibniz Institute for Photonic Technologies, Germany	From April 2015 (for 3 months)

The recipients for the grant program for technology exchanges (Study in Japan) in FY2014

Name	Facility, Post	Trainee Name	Nationality	Period
Wataru Yoshida	Assistant Professor, School of Bioscience and Biotechnology, Bioscience and Environmental Biotechnology Course, Tokyo University of Technology	Annika Busch	Germany	From April 2014 (for 7 months)
Hayato	Professor,	Lkhaasuren	Mongolia	From August 2014

Miyachi	Tokai University School of Medicine	Nemekhbaatar		(for 2 years)
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[Invitation] Posted on our website

[Acceptance of Application] Anytime in every quarter of a year

[Screening procedures] by exchange screening committee members

[Screening results (Grant amount provided)]

Dispatch: 8 cases, total 1.68 million yen

Overseas Training: 1 case, 0.9 million yen

Study in Japan: 2 cases, total 2.25 million yen

IV. Grant Program for Research Study

Since there are various challenges in the field of biomedical engineering measuring technologies related to the living body, grant programs in which the result of research is utilized broadly in a society have an important implication. We did the screening in the same way as the program for the development of technology and determined to subsidize the following research:

Grants for Research Study

Name	Facility, Post	Research Title	Amount of Grant
Naomi Yagi	Program-Specific Researcher, Neurology, Kyoto University Hospital	Research of dysphagia in non-restricted biological data measurement	1.97 million yen

[Invitation] Started from July 10, 2014 ⇒ invitation letters mailed to 281 locations and posted on our website

[Due date for applications] Closed on September 16; 2 applications received

[Screening procedures]

- Primary screening: October 7 to November 4
- Secondary screening: November 11 to December 5
- Final screening: At the selection committee meeting on December 13

V. Gathering and Providing Information on Biomedical Engineering Measuring Technologies

In order to promote the broad use of information regarding biomedical engineering measuring technologies related to the living body, we compiled data of the foundation's activities, such as the results of our grant programs for the research and technology exchanges, and issued our Annual Report No. 28. It was distributed widely to related facilities and opened as a database of biomedical engineering measuring technologies on our website. Researchers can get useful information using its retrieval function.

[Publication] Annual Report No. 28

- Issued on June 20, 2014
- Printed copies: 600
- Distribution to: 270 persons concerned, 84 universities, 130 related corporations
- Annual report is provided free of charge

VI. Grant for the Promotion of Science Education

We think that raising children to have logical thinking skills and creativity will help not only the progress of science technology but also the development of Japan. Hence, we have sponsored a grant program for the promotion of science education in middle schools and high schools since FY2104.

- Activities Subject to Grant

[Individual] Planning and practice for science classes, club activities, etc. that may help increase students' interest in science at educational facilities, such as middle school and high schools.

[Program] Programs jointly planned and run by educational facilities such as schools, museums, science education centers, research facilities such as colleges and universities, school boards and so on.

The 1st (FY2014) grant for science education

	No. of Cases/Amount of Grant
Individual	71/20.32 million yen
Program	15/10.41 million yen