Press Release #1614

April 27, 2023

Japan Science and Technology Agency (JST)
5-3, Yonbancho, Chiyoda-ku, Tokyo 102-8666

JST to fund seven research projects under the Advanced International Collaborative Research Program (AdCORP)

The Japan Science and Technology Agency (JST, President HASHIMOTO Kazuhito) has approved funding for seven new research projects under the Advanced International Collaborative Research Program (AdCORP) [1](Appendix 1).

JST launched the AdCORP call for proposals for Japan-based researchers seeking to collaborate with foreign-based researchers of targeted countries and regions[2] in seven designated fields of research, including biotechnology, AI and information, materials, semiconductors, energy, quantum and telecommunications.

A total of 43 proposals were submitted to the call, out of which seven proposals in six of the research fields were selected for funding following an evaluation by a panel of experts (Appendix 2).

Each project is planned to be funded for five years with support of up to 26 million JPY per year project.

[1]About the Advanced International Collaborative Research Program (AdCORP)
https://www.jst.go.jp/inter/english/program_e/kiban_e/gather_e/adcorp.html

[2]Foreign-based researchers of targeted countries and regions
Researchers who are currently receiving or expecting to receive support from funding agencies in targeted countries and regions:
Canada, EU, France, Germany, Italy, Sweden, the UK, the U.S. and others

Attachments

Appendix 1: List of Projects Selected for Funding
Appendix 2: List of Panel of Experts Members
Annex: Evaluation Criteria

Enquiries

Department of International Affairs
Japan Science and Technology Agency (JST)
SATO Masaki
K's Gobancho, 7 Gobancho, Chiyoda-ku, Tokyo 102-0076
Tel: +81-3-5214-7375　Fax: +81-3-5214-7379
E-mail: adcorp[at]jst.go.jp

Appendix 1

List of Projects Selected for Funding

	Title	Researcher Country/Name/ Affiliation	Research Abstract
1	(Biotechnology) Ultra-high sensitivity Raman spectroscopy for high-throughput molecular diagnosis	(Japan) FUJITA Katsumasa Professor, Department of Applied Physics, Osaka University (United States) Ishan Barman Associate Professor, Department of Mechanical Engineering, Johns Hopkins University	This research will develop fundamental technologies for highly sensitive and high-throughput molecular analysis that will contribute to highly accurate medical care and drug discovery support in the future. Specifically, this study aims to develop a technological platform that can detect molecular vibrations in specimens using Raman spectroscopy with high sensitivity, identify molecules based on this information, detect lesions and viruses, and analyze drug responses in detail. To achieve this, the Japan team will develop an analytical system that extends the spectroscopical technology in which they have been technically advanced, and conduct molecular measurements using this system, while the U.S. team will develop a technology that significantly enhances Raman scattering by using metallic nanostructures to achieve high sensitivity and high throughput and develop an analytical technique to analyze the data obtained from the measurements. In terms of international mobility activities, research members from both Japan and the U.S. will visit each other's laboratories about twice a year to hold hands-on technology exchange meetings. In addition, international workshops will be held jointly to discuss issues related to new technologies and their future potential, and to foster a researcher community.

	Title	Researcher Country/Name/ Affiliation	Research Abstract
2	(AI and Information) Realization of people- and environment-friendly artifacts by leveraging computational design and fabrication	(Japan) IGARASHI Takeo Professor, Graduate School of Information Science and Technology, The University of Tokyo (United States) Stefanie Mueller Associate Professor, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology (MIT)	This research aims to overcome the limitations of the mass-production mass-consumption model by developing technologies that enable the design and manufacture of artifacts that are adaptive to the individual and the environment, thereby improving the well-being of individuals and reducing the burden on the global environment. More specifically, technologies that allow the design and manufacture of products that suit the environment and the individual, and to manufacture only what is needed when it is needed, or to change the form and function of products to meet the needs of the moment will be developed. This research will be conducted through close collaboration between teams from both countries. First, new digital fabrication methods will be developed using materials engineering and electrical engineering as enabling technologies. Furthermore, as a design technique, technologies will be developed to support the design of adaptive artifacts by utilizing the knowledge of machine learning and physical simulation. In terms of international mobility activities, about five young Japanese researchers will make a six months research visit to the U.S., and young researchers will also be invited to Japan from the partner county.

Title		Researcher Country/Name/ Affiliation	Research Abstract
3	(Materials) Physical properties and device applications of 2D Mg-intercalated GaN Superlattice (MiGs) Nanostructure	(Japan) AMANO Hiroshi Professor, Institute of Materials and Systems for Sustainability, Nagoya University (United States) Huili Grace Xing William L. Quackenbush Professor, School of Electrical and Computer Engineering and Department of Materials Science and Engineering, Cornell University Jaime Marian Professor, Department of Materials Science and Engineering, University of California, Los Angeles	This collaborative research aims to comprehensively study the 2D Mg-intercalated GaN superlattice (MiGs), a newly discovered nanostructure, as well as first-of-its-kind semiconductor/metal superlattice which reveals exceptionally intriguing physical and technological properties, and put EBG device into practical use. The Japanese team will lead international joint research, evaluate physical properties of samples, and process devices. The U.S. team will aim to reproduce on a wafer scale by plasma-assisted molecular beam epitaxy and also elucidate the dynamic process of self-assembly by molecular dynamics. These studies will improve process technology and clarify how wafer-sized MiGs can be realized and it is expected to promote rapid growth in new fields of the power electronics industry and ultimately contribute to the realization of a carbon-neutral society. In terms of international mobility activities, young postdoctoral researchers from the Japanese research team will visit collaborators in the United States and foster a foundation for intensive research collaboration over the next few years. In addition, core members of the U.S. team will be invited to the Japanese research team as visiting researchers.

	Title	Researcher Country/Name/ Affiliation	Research Abstract
4	(Materials) Exploration of functional transition-metal oxides and their structure-property relationships	(Japan) SHIMAKAWA Yuichi Professor, Institute for Chemical Research, Kyoto University (United Kingdom) J. Paul Attfield Professor, Centre for Science at Extreme Conditions and School of Chemistry, University of Edinburgh	This collaborative research focuses on transition metal oxides as future materials and aims to synthesize new materials with novel functional properties useful for electronics, spintronics, energy and environmental fields. Through the complementary use of the specific synthesis equipment of the Japanese and UK teams and the efficient use of the large-scale quantum beam facilities in Japan, UK and Europe, it is expected that new oxide materials with innovative functionalities will be discovered. With a global network of researchers, equipment, and facilities, in addition, it is also expected to develop a new interdisciplinary novel functional materials research science. In terms of international mobility activities, young researchers and students will be supported for short-term and long-term research visits, for joint research, exchange and network-building activities. As a part of this, through collaboration with the UK team young Japanese-side researchers will have the opportunity to use the beamline for large-scale quantum beam experiments. Visits from young researchers from the UK team to Japan are also planned.

Title		Researcher Country/Name/ Affiliation	Research Abstract
5	(Semiconductors) Material / Device / Circuit / Algorithm Comprehensive Research for Large-Scale Spintronics Probabilistic Computer	(Japan) FUKAMI Shunsuke Professor, Research Institute of Electrical Communication, Tohoku University (United States) Kerem Camsari Assistant Professor, Department of Electrical and Computer Engineering, University of California, Santa Barbara	This collaborative research aims to comprehensively establish a fundamental understanding and technological basis of the materials, devices, circuits, and algorithms required for large-scale spintronics probabilistic computers. The Japanese team mainly conducts material and device studies aimed at improving the performance and reliability of superparamagnetic tunnel junction elements, which are the most important components of probabilistic computers, whereas the U.S. team will mainly conduct circuit and algorithm studies. In addition, both teams will cooperate to conduct a medium-scale demonstration and proof-of-concept test of the understanding and elemental technologies they have constructed to demonstrate their usefulness, and to build a foundation for measures and demonstrations of ultra-high-performance and large-scale circuits after the research period is over. In terms of international mobility activities, young researchers from the Japanese team will travel to the U.S. team with the developed devices, implement them in circuits, verify their operation, and identify potential issues. Also, young researchers from the U.S. team will travel to the Japanese team to measure the device characteristics and use the obtained device parameters to perform circuit simulations and improve circuit, architecture and algorithm performance. In this way, joint research will be promoted with through exchange with young researchers.

	Title	Researcher Country/Name/ Affiliation	Research Abstract
6	(Quantum) Development of topological antiferromagnetic spintronics	(Japan) NAKATSUJI Satoru Professor, Department of Physics & Graduate School of Science / Director, Trans-Scale Quantum Science Institute, The University of Tokyo (United States) Collin Broholm Director, Institute for Quantum Matter and Department of Physics and Astronomy, Johns Hopkins University	This collaborative research aims to develop topological antiferromagnetic spintronics, in particular, technology for ultrafast nonvolatile memory devices operating at a picosecond scale used for next generation logic circuits. Specifically, the Japanese research team will develop topological antiferromagnets and further fabricate the device for nonvolatile memory. The U.S. research team will clarify the magnetic and electric structures and their dynamics of the topological antiferromagnets. Through international collaboration including young researchers, the teams will perform cutting-edge research covering the basis and the application of the memory device and work to form a leading international network for developing topological antiferromagnetic spintronics. In terms of international mobility activities, young Japanese researchers at the doctoral and postdoctoral level will take extended visits to universities in partner countries, in order to acquire theoretical and experimental analysis methods related to this research. At the same time, the Japan team will accept young researchers from the U.S. team and conduct technical exchanges. In addition, the research will continue in the United States to nurture the young researchers to become independent scientists at universities and industries as well as leaders in their fields.

	Title	Researcher Country/Name/ Affiliation	Research Abstract
7	(Telecommunications) Green IoT: Fundamental Technologies for Next-Generation Sensor Networks	(Japan) TANAKA Yuichi Professor, Graduate School of Engineering, Osaka University (United States) Antonio Ortega Professor, Viterbi School of Engineering, University of Southern California	This collaborative research endeavors to advance the fundamental technologies of "Green IoT" through the seamless integration of data-driven artificial intelligence (AI) and AI-driven sensing systems. The collaborative effort between Japanese and American research teams will culminate in the development of a comprehensive theory of Green IoT, balancing precision and energy consumption, as well as the design of flexible signal processing and machine learning subsystems that can automatically optimize internal algorithms. Additionally, the project aims to pioneer ultra-low-energy wireless communication technology that is compatible with Green IoT systems. In parallel, the Japanese research team will dedicate their efforts to implementing hypermodal smart sensors, while also validating the Green IoT technology through real-world data. This dynamic and synergistic research program is expected to culminate in next-generation Green IoT technologies, spanning from the theoretical foundations to practical applications. As a part of international mobility activities, young researchers from the Japanese research team will have the opportunity to immerse themselves in the top research circles of the U.S. team for about one year, enabling them to foster critical interdisciplinary collaboration. Simultaneously, young researchers from the U.S. team will be welcomed to Japan, establishing the groundwork for an enduring research exchange.

Appendix 2

List of Panel of Experts Members

Program Director

Name	Position and Institution
Dr. MIYANO Kenjiro	Emeritus Fellow, National Institute for Materials Science

Biotechnology

Name	Position and Institution
Dr. TAKEYAMA Haruko	Professor, School of Advanced Science and Engineering, Waseda University
Dr. TAKAGI Masahiro	Professor, Graduate School of Advanced Science and Technology, Japan Advanced Institute of Science and Technology
Dr. TAKEDA Mizuho	President, MVP Inc.
Dr. TABATA Satoshi	Director, Department of Frontier Research and Development, Kazusa DNA Research Institute
Dr. HASHIMOTO Setsuko	President, CellSeed Inc.
Dr. YURA Kei	Professor, Faculty of Core Research Natural Science Division, Ochanomizu University

AI and Information

Name	Position and Institution
Dr. AIZAWA Akiko	Vice Director, National Institute of Information
Dr. ONO Tetsuo	Professor, Faculty of Information Science and Technology, Hokkaido University
Dr. SUGIYAMA Masashi	Director, Center for Advanced Intelligence Project, RIKEN Center for Advanced Intelligence Project and Professor, Graduate School of Frontier Sciences, The University of Tokyo
Dr. HITOSUGI Taro	Professor, Graduate School of Science, The University of Tokyo
Dr. HORI Koichi	Executive Director, National Institutes for the Humanities

Materials

Name	Position and Institution
Dr. AIDA Takuzo	Distinguished Professor, The University of Tokyo and Deputy Center Director, Center for Emergent Matter Science, RIKEN
Dr. INAGAKI Shinji	Managing Director, TOYOTA Central R&D Labs., Inc.
Dr. KATAOKA Kazunori	Director General, Innovation Center of NanoMedicine, Kawasaki Institute of Industrial Promotion
Dr. KITAGAWA Susumu	Deputy Director-General and Distinguished Professor, Kyoto University Institute for Advanced Study
Dr. YASHIMA Eiji	Professor, Graduate School of Engineering, Nagoya University

Semiconductors

Name	Position and Institution
Dr. AMANO Hideharu	Professor, Faculty of Science and Technology, Keio University
Dr. ISHIHARA Tohru	Professor, Graduate School of Informatics, Nagoya University
Dr. IWASAKI Hiroe	Professor, Institute of Engineering, Tokyo University of Agriculture and Technology
Dr. TAKAGI Shinichi	Professor, Graduate School of Engineering, The University of Tokyo
Dr. NAKAMURA Hiroshi	Professor, Graduate School of Information Science and Technology, The University of Tokyo
Dr. HIRAMOTO Toshiro	Professor, Institute of Industrial Science, The University of Tokyo

Energy

Name	Position and Institution
Dr. KANNO Ryoji	Professor Emeritus, Institute of Innovative Research, Tokyo Institute of Technology
Dr. INABA Minoru	Professor, Faculty of Science and Engineering, Doshisha University
Dr. KANEMITSU Yoshihiko	Professor, Institute for Chemical Research, Kyoto University
Dr. SAKAEBE Hikari	Prime Senior Researcher, Research Institute of Electrochemical Energy, Department of Energy and Environment, National Institute of Advanced Industrial Science and Technology
Dr. NAKAMURA Yumiko	Deputy Director, Energy Process Research Institute, Department of Energy and Environment, National Institute of Advanced Industrial Science and Technology
Dr. HORITA Teruhisa	Director, Research Institute for Energy Conservation, Department of Energy and Environment, National Institute of Advanced Industrial Science and Technology

Quantum

Name	Position and Institution
Dr. KAWAKAMI Norio	Visiting Professor, Graduate School of Science and Engineering, Ritsumeikan University
Dr. IWAMOTO Satoshi	Professor, Research Center for Advanced Science and Technology, The University of Tokyo
Dr. KOASHI Masato	Professor, Graduate School of Engineering, The University of Tokyo
Dr. TAKAHASHI Yoshiro	Professor, Graduate School of Science, Kyoto University
Dr. NAKAMURA Yasunobu	Professor, Graduate School of Engineering, The University of Tokyo
Dr. FUJII Keisuke	Professor, Graduate School of Engineering Science, Osaka University

Telecommunications

Name	Position and Institution
Dr. YAMANAKA Naoaki	Professor, Faculty of Science and Technology, Keio University
Dr. KATO Nei	Dean, Graduate School of Information Science, Tohoku University
Dr. TOMIZAWA Masahito	Head, NTT Device Innovation Center
Dr. NAKAO Akihiro	Professor, Graduate School of Engineering, The University of Tokyo
Dr. HASEGAWA Hiroshi	Professor, Graduate School of Engineering, Nagoya University
Dr. FUJISHIMA Minoru	Professor, Graduate School of Advanced Science and Engineering, Hiroshima University

Annex

Evaluation Criteria

(1) Consistency with research field and purpose of the call

(2) Eligibility and current research activity of the representative researcher of the Japan-side team and partner team
(Research track record; international research experience; feasibility of international joint research; etc.)

(3) Eligibility of research institution
(Availability of support from research institution; capability to support international exchange activities; etc.)

(4) Research potential and synergy effects
(Likelihood of high impact research; potential for post-project continued international collaboration; etc.)

(5) Strength of research plan

(6) Potential and continuity of research exchange activities
(Potential for research exchange; potential for nurturing young researchers, including sending researchers to the partner country; potential for receiving foreign researchers in Japan, etc.)

(7) Budget feasibility
(Feasibility for the proposed research, collaboration and researcher exchange activities given the proposed budget available etc.)