

JST and PMU-B (Thailand) jointly to fund five research projects in the “Biotechnology” field under the NEXUS program

The Japan Science and Technology Agency (JST) has approved funding for five new international joint research projects under the framework of Networked Exchange, United Strength for Stronger Partnerships between Japan and ASEAN (NEXUS^{*1}), “Japan-Thailand international joint research” in the field of Biotechnology (Appendix 1).

NEXUS is a flexible and multi-layered cooperative framework, leveraged by the long history of science and technology cooperation between Japan and ASEAN. It is aimed to further strengthen the cooperative research relationship between Japan and ASEAN as partners in co-creating innovations in science and technology.

One of the initiatives, “International Joint Research,” NEXUS supports international joint research in common priority challenges between both sides.

In collaboration with Program Management Unit for Human Resources & Institutional Development, Research and Innovation (PMU-B ^{*2}), JST has conducted a call for proposals for international joint research projects (Appendix 2).

In addition, this call also supports initiatives for fostering researchers’ capacity building that contribute to international joint research.

We received 26 applications for this call, and after evaluation by experts from both countries and consultations between JST and PMU-B, we have decided to select five projects for funding.

The research period is planned for three years (36 months).

*1 NEXUS: <https://www.jst.go.jp/aspire/nexus/en/index.html>

*2 PMU-B: <https://www.pmu-hr.or.th/en/home/>

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Contact

KISHIDA Eriko

Department of International Affairs

Japan Science and Technology Agency

K's Gobancho, 7 Gobancho, Chiyoda-ku, Tokyo 102-0076

Tel: +81-3-3222-2069 Fax: +81-3-6268-9413

E-mail: nexus@jst.go.jp

“Empowering Science, Inspiring Futures”

Our world faces unprecedented global challenges — such as climate change, energy crises, and emerging infectious diseases — that demand innovative solutions. JST will rise to these challenges through “Science and Technology,” as a national research and development agency that plays a central role in implementing Japan’s science, technology, and innovation policy. We support fundamental research and startups to create new value, develop R&D strategies, foster the next generation of talent, disseminate vital information, and manage the Japan University Fund. Like a compass guiding ships through turbulent waters, JST will chart the way towards a vibrant and secure future by empowering science through a multifaceted approach.

Abstracts of selected projects

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Thailand side)	
1	Next-Generation Green Nanopesticides: Integrating Nanobiotechnology and Multi-Omics to Control Microbial Communities and Rice Bacterial Leaf Blight	<p>UTADA Andrew (Associate Professor, Institute of Life and Environmental Sciences, University of Tsukuba)</p>	<p>This study aims to develop next-generation green nanopesticides for the sustainable control of rice bacterial leaf blight. Specifically, the Thail team will synthesize plant-based nanopesticides and conduct disease control and soil microbiome analyses, while the Japanese team will be responsible for omics analysis, microfluidics, imaging, and bioinformatics.</p> <p>Through joint research by both teams, it is expected to elucidate the mechanisms of rice immune responses and soil microbial dynamics, create an environmentally friendly nanopesticide prototype, and foster the development of internationally active researchers.</p>
		<p>Wuttipong MAHAKHAM (Assistant Professor, Department of Biology, Faculty of Science, Khon Kaen University)</p>	

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Thailand side)	
2	Establishment of a Greenhouse Gas Reduction Cultivation for Vigna Species through Control of Symbiotic Microbes	OKAZAKI Shin (Professor, Institute of Agriculture, Tokyo University of Agriculture and Technology)	<p>This collaborative research aims to develop technology that enables Vigna legume crops to preferentially establish symbiosis with rhizobia exhibiting high nitrogen fixation and N₂O reduction capabilities.</p> <p>The Thai team will explore Vigna germplasm and symbiotic rhizobia and provide breed and cultivation techniques of Vigna legumes, while the Japanese team will conduct plant genetic, molecular microbiology, and informatics analyses of Vigna legumes and their symbiotic rhizobia.</p> <p>Through this collaboration, we will conduct the following activities: (1) determination of Rj gene types in major mung bean varieties that select specific symbiotic rhizobia, (2) elucidation of the molecular mechanisms underlying rhizobial exclusion by mung bean Rj genotypes, (3) screening of elite rhizobia with both high nitrogen fixation and high N₂O reduction abilities, (4) breeding of mung bean lines that accumulate favorable Rj genotypes, and (5) conducting a feasibility cultivation test using elite rhizobia in conjunction with Rj genotype-accumulated mung beans. Through the collaborative project, we will present the world's first greenhouse gas-reducing cultivation system for Vigna legumes that reduces both the amount of chemical fertilizer input and nitrous oxide emissions.</p>
		Neung TEAUMROONG (Professor, Institute of Agricultural Technology, Suranaree University of Technology)	

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Thailand side)	
3	Transformative glycomics: decoding and controlling microbial ecosystems	<p>TATENO Hiroaki (Attached to Research Group, Cellular and Molecular Biotechnology Research Institute, National Institute of Advanced Industrial Science and Technology)</p> <p>Deanpen JAPRUNG (Principal Researcher, Responsive Materials and Nanosensors Research Group, National Nanotechnology Center)</p>	<p>This study develops technology to obtain glycomic information for individual microorganisms constituting microbial communities. Furthermore, by combining nanopore sequencers with machine learning, it establishes technology to analyze polysaccharides present in the gut at the single-molecule level. These technologies will be used to analyze the gut microbiota of disease-model mice. Based on the data obtained, we propose a novel concept for disease control by redesigning the composition and function of microbial communities through modification of the intestinal glycome using glycan synthesis regulators.</p> <p>The Japanese side will be responsible for acquiring microbial glycomic information and developing disease control technologies, while the partner side will handle the analysis technology for intestinal polysaccharides. Through joint research by both national teams, we will pioneer new possibilities for disease treatment and prevention through the control of the gut glycome.</p>

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Thailand side)	
4	Development of Biorefinery Process for Biomass Waste Conversion to Aviation Fuel via a Multi-Carbon Yeast Platform	NAKATA Eiji (Professor, Institute of Advanced Energy, Kyoto University)	<p>This research aims to develop a biorefinery technology for the low-cost production of farnesene, a key precursor of sustainable aviation fuel (SAF), from agricultural residues.</p> <p>Specifically, the Japanese team will design and engineer a multicarbon-utilizing yeast capable of co-consuming glucose, xylose, glycerol, and acetate, while the Thai team will apply advanced pretreatment technologies to rice straw and bagasse to efficiently obtain fermentable sugars and lignin byproducts.</p> <p>Through bilateral collaboration, the project will demonstrate farnesene production at the 50 L scale (50–80 g/L) and achieve the high-value utilization of lignin. Furthermore, by integrating synthetic biology, precision fermentation, AI-driven design, and techno-economic and carbon footprint analyses, the project aims to establish a next-generation ASEAN-style biorefinery model, contributing to decarbonization and the Bio-Circular-Green (BCG) economy.</p>
		Verawat CHAMPREDA (Principal Researcher, Biorefinery and Bioproduct Technology Research Group, National Center for Genetic Engineering and Biotechnology)	

No.	Title	Principal Investigator (Japan side)	Research Abstract
		Principal Investigator (Thailand side)	
5	A Microbial Blueprint for Bio-Surveillance and Productivity in Shrimp Aquaculture	HIRONO Ikuo (Professor, Department of Marine Bioresources, Tokyo University of Marine Science and Technology)	<p>This research aims to establish a scientific foundation for "Mizu-zukuri" (water conditioning) in Thai shrimp aquaculture, establish technologies for the preservation and utilization of superior microbial communities, and scientifically validate the effectiveness of existing beneficial microbial technologies possessed by the Thai side, thereby stabilizing the aquaculture industry.</p> <p>Specifically, the Japanese team will lead genomic analysis using next-generation sequencers (shotgun metagenomic analysis, single-cell genome analysis, and bacterial community analysis) and the development of cryopreservation technologies for microorganisms, while the Thai team will lead sample collection at aquaculture sites and the validation of the effectiveness of both technologies primarily implemented by the Japanese team.</p> <p>Through joint research by both teams, it is expected that new technologies for the scientific management of aquaculture pond ecosystems will be created. Furthermore, the next generation of researchers is expected to be nurtured, fostering a strong network that will sustainably connect both countries.</p>
		Kunlaya SOMBOONWIWAT (Professor, Department of Biochemistry, Faculty of Science, Chulalongkorn University)	

Abstract of the joint call for proposal

(1) Partner funding agency

Organization name: Program Management Unit for Human Resources & Institutional Development, Research and Innovation (PMU-B)

URL: <https://www.pmu-hr.or.th/en/home/>

(2) Research field

Biotechnology

(3) Researcher eligibility

Any independent researcher personally affiliated with a domestic Japanese research institution, including universities, independent administrative institutions, national/public testing and research institutions, specially authorized corporations, public-service corporations, and enterprises

(4) Research duration

Three years (36 months)

(5) Funding amount (by JST, per project)

- Direct expenses:

International joint research: Up to 24 million Japanese Yen

International joint research with an option of researchers' capability building: Up to 66 million Japanese Yen

Researchers' capability building: Up to 3,900 thousand Japanese Yen / person / year

- Indirect expenses: 30% of direct expenses

(6) Evaluation procedure

- Evaluation by independent committees consisting of experts from both countries.
- Discussion and decision by JST and PMU-B based on evaluation result.

(7) Evaluation criteria

- Consistency with the research field of the call
- Capability of research leaders
- Expected scientific results of the joint research
- Synergy effects of international collaboration
- Validity of research plan
- Validity of exchange plan

- Expected economic and social impact of the joint research
- Feasibility of implementation (given proposed plan, participants, budget, facilities, means of cooperation, etc.)

Experts for the evaluation (JST side)

Name	Position and organization	Role
NOMURA Nobuhiko	Professor/Director/Professor, Faculty of Life and Environmental Sciences / Microbiology Research Center for Sustainability / Tsukuba Institute for Advanced Research, University of Tsukuba	Program Officer
IIDA Tetsuya	Director, Research Institute for Microbial Diseases, The University of Osaka	Advisor
ICHIHASHI Yasunori	Team Director, Center for Sustainable Resource Science, RIKEN	Advisor
KOSUGI Akihiko	Director/Project Leader, Biological Resources and Post-harvest Division, Japan International Research Center for Agricultural Sciences	Advisor
SUGIYAMA Akifumi	Professor, Research Institute for Sustainable Humanosphere, Kyoto University	Advisor
HARA Hirofumi	Project Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo	Advisor
FUJIYAMA Kazuhito	Professor, International Center for Biotechnology, The University of Osaka	Advisor
MATSUI Tomoko	Head of R&D, Research and Development, Novozymes Japan Ltd.	Advisor
MARUYAMA Junichi	Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo	Advisor

(Advisors are listed in order of the Japanese syllabary.)

(Position and organization are as of the time of evaluation.)