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**JST is to fund eight research projects for the e-ASIA Joint Research Program in the fields of “Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)” and “Environment (Marine Science and Climate Change)”**

The Japan Science and Technology Agency (JST) decided to start new projects within the framework of the e-ASIA Joint Research Program \*1 (Appendix 1, 2).

JST and 4 funding agencies from 4 countries (Appendix 3) jointly opened the call for research projects in the fields of “Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)” and “Environment (Marine Science and Climate Change)”.

A total of 31 proposals, 11 in the field of “Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)” and 20 in the field of “Environment (Marine Science and Climate Change)” were submitted in response to the joint call. Based on an expert evaluation conducted in each country (Appendix 4), JST and the other funding agencies jointly decided to adopt eight projects, four in the field of “Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)” and four in the field of “Environment (Marine Science and Climate Change)”.

The research period is scheduled to be three years.

\*1) e-ASIA Joint Research Program (e-ASIA JRP)

Through the acceleration of science and technology research exchange and collaboration in the East Asian Summit (EAS) member countries, the e-ASIA Joint Research Program (e-ASIA JRP) aims to strengthen research and development capabilities towards resolution of shared challenges across the region, including those associated with materials, alternative

energy, agriculture, health research, disaster risk reduction and management, advanced interdisciplinary research towards innovation, and environment.

As part of that objective, e-ASIA JRP is intended to support collaborative research implemented among three or more of its member countries. Through the implementation of joint research among participating countries in agreed fields of research, it is the goal of the e-ASIA JRP to contribute to economic and human resource development, as well as the resolution of various challenges in the region.

URL: <https://www.the-easia.org/jrp/>

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#### Contact

Department of International Affairs, JST

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

SATO Masaki,

Tel: +81-3-5214-7375

E-mail: [easiajrp\[at\]jst.go.jp](mailto:easiajrp[at]jst.go.jp)

## Appendix 1: Abstracts of the new projects – Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
Data-Driven Design of Mechanical properties in metallic Layered structures	<u>ENOKI Manabu</u> (Japan)	Professor, School of engineering, The University of Tokyo	<p>This collaborative research aims to the design optimization of mechanical properties in metallic layered structures by data-driven approach that integrates various computational simulations and information science techniques.</p> <p>Specifically, the Japanese team is developing new methods for design in structural materials that combines calculations and informatics, and the Singapore team is developing the multiscale analysis that combines nanoscale calculations and mesoscale calculations. <del>and</del>– The Indonesian team will evaluate the mechanical properties of the metallic laminated device and analyze the mechanism of mechanical behaviors experimentally.</p> <p>Through collaborative and complementary research among three countries, the construction of new material research and development methods in metallic layered structures is expected that integrate experimental data, computational simulations, and information science techniques. It is also expected the development of novel stretchable/flexible electronics devices as their applications.</p>
	Mark Jhon (Singapore)	Senior Scientist, Institute of High Performance Computing, Agency for Science, Technology and Research	
	Fergyanto Gunawan (Indonesia)	Associate Professor, Industrial Engineering, BINUS University	

Underlined: Lead Principal Investigator

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
Computational Design of High Entropy Alloys for Catalyst and Battery Applications	SHIMIZU Koji (Japan)	Assistant Professor, School of Engineering, The University of Tokyo	<p>This collaborative research aims to computationally design high entropy alloys (HEAs) for catalyst and battery applications. Understanding the nature of HEAs, a new class of multicomponent materials will lead to their potential industrial applications. Taking advantage of atomistic calculations and materials informatics (MI) methods, we reveal their physical properties and develop innovative functional materials.</p> <p>Specifically, the Japanese research team will investigate the reaction dynamics using machine learning potentials based on first principles, The Filipino team will develop MI models to clarify the structures with adsorbates, the Singaporean team will perform high-throughput searches of stable surface structures, and the Thai team will investigate the grain boundary properties by Monte Carlo method.</p> <p>Through collaborative and complementary research among four countries, this research is expected to obtain a comprehensive atomic-scale understanding of HEAs. Furthermore, we expect the strengthening of Asian partnerships through this cooperative research initiated by the young researchers.</p>
	<u>Allan Abraham Padama</u> (Philippines)	Professor, Institute of mathematical Sciences and Physics, University of the Philippines, Los Baños	
	Teck Leong Tan (Singapore)	Deputy Department Director, Institute of High- Performance Computing, Agency for Science, Technology and Research	
	Tongjai Chookajorn (Thailand)	Researcher, Smart Alloys and Manufacturing Research Team, National Science and Technology Development Agency (NSTDA), National Metal and Materials Technology Center (MTEC)	

Underlined: Lead Principal Investigator

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
<p>Data-driven computational design of high-performance thermoelectrics in atomic layers and topological materials</p>	<p><u>ISHII Fumiyuki</u> (Japan)</p>	<p>Associate Professor, Nanomaterials Research Institute, Kanazawa University</p>	<p>The purpose of this study is to design highly efficient thermoelectric materials from two-dimensional (2D) and topological materials with flexibility.</p> <p>The Japanese research team will predict the thermopower including transverse thermoelectric effect, anomalous Nernst effect, by using high-throughput density functional calculations. The Thai research team will supply the experimental data that will be used for Japanese and Indonesia team in their computer simulation and they will fabricate the devices based on the suggestion from Japanese and Indonesian team. The Indonesian team will develop a new formalism to predict thermoelectric properties with high accuracy.</p> <p>Through collaborative and complementary research among the three countries, this research is expected to find more thermoelectric materials from 2D and topological materials with significant efficiency.</p>
	<p>Tosawat Seetawan (Thailand)</p>	<p>Lecturer, Faculty of Science and Technology, Rajabhat University, Sakon Nakhon</p>	
	<p>Melania Suweni Muntini (Indonesia)</p>	<p>Lecturer, Faculty of Science, Sepuluh Nopember Institute of Technology</p>	

Underlined: Lead Principal Investigator

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
Multi-scale Simulations and Design for CO <sub>2</sub> recycling related processes	<u>MORIKAWA Yoshitada</u> (Japan)	Professor, Graduate School of Engineering, Osaka University	<p>This collaborative research aims to elucidate the elementary chemical processes related to CO<sub>2</sub> storage and reduction, fuel cells, etc. by making full use of multi-scale simulation methods and experimental methods, and to propose new materials related to more desirable CO<sub>2</sub> recycling processes.</p> <p>Specifically, the Japanese team will use multi-scale simulation to elucidate the CO<sub>2</sub> reduction reaction and fuel cell electrode catalytic reaction process and design new catalysts material, and the Indonesian team will experimentally and theoretically investigate the CO<sub>2</sub> storage material. The Thai team will conduct experimental studies on the electrochemical reaction process of CO<sub>2</sub>.</p> <p>Through collaborative and complementary research among three countries, this project is expected to propose guidelines to design new materials related to CO<sub>2</sub> recycling and to contribute to alleviating the problem of global warming.</p>
	Suprijadi (Indonesia)	Professor, Faculty of Mathematics and Natural Sciences, Bandung Institute of Technology	
	Joongjai Panpranot (Thailand)	Professor, Department of Chemical Engineering, Chulalongkorn University	

Underlined: Lead Principal Investigator

## Appendix 2: Abstracts of the new projects – Environment (Marine Science and Climate Change)

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
Application of eDNA metabarcoding in faunal biodiversity assessment of Indo-Pacific mangroves vulnerable to climate change	<u>KAJITA Tadashi</u> (Japan)	Professor, Tropical Biosphere Research Center, University of the Ryukyus	<p>This study aims to observe and analyze the biodiversity of mangrove ecosystems using eDNA metabarcoding and Species Distribution Models (SDM) to understand the current status of biodiversity and to predict its change under global climate change.</p> <p>The Japanese team will be the lead country in the collaborative research network, and member countries will conduct field surveys and lab works to obtain eDNA samples. The Japanese team conduct metabarcoding analysis, mainly on fish and macrobenthos species. Species diversity data obtained from observation sites will be analyzed using SDM to estimate suitable past, present, and future distribution ranges. The estimated distribution ranges and their changes will be used to assess the vulnerability.</p> <p>By collaborating with teams in the three countries covered by the grant and colleagues from other international collaborative research projects, we will obtain species information over a wide range in the Indo-Pacific region.</p>
	Mohammad Basyuni (Indonesia)	Professor, Center of Excellence for Mangrove, Universitas Sumatera Utara	
	Venus Leopardas (Philippines)	Associate Professor, Marine Biology and Environmental Science, Mindanao State University at Naawan	

Underlined: Lead Principal Investigator

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
<p>Enhancing Climate Change Resilience of Socio-Ecological Systems in the Coral Triangle and Its Surrounding Areas</p>	<p><u>SUWA Rempei</u> (Japan)</p>	<p>Senior Researcher, Japan International Research Center for Agricultural Sciences (JIRCAS)</p>	<p>This collaborative research aims to establish a new framework for enhancing the resilience of socio- ecological systems in the coastal zones of the coral triangle and its surrounding areas.</p> <p>Specifically, the Japanese team will lead the development of an innovative model system, the applications of advanced remote sensing methods and the development of new silvo-fishery methods. The Filipino team will apply them to the super typhoon landfall-prone areas and the abandoned fishpond areas. The Indonesian team will apply them to the coastal areas suffering from the significant coastal erosion due to combined effects of the relative sea level rise with land subsidence and mangrove deforestation, and conduct surveys for proposing a way to enhance the holistic ecosystem services.</p> <p>Through collaborative and complementary research among three countries, this research is expected to provide a comprehensive framework to enhance the resilience in the region under increasing risk of climate change.</p>
	<p>Rene Rollon (Philippines)</p>	<p>Professor Institute of Environmental Science and Meteorology, University of the Philippines, Dilliman</p>	
	<p>Analuddin (Indonesia)</p>	<p>Professor, Ecology &amp; Conservation, Halu Oleo University</p>	

Underlined: Lead Principal Investigator



Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
<p>Marine Heat Waves in the Western Pacific: Detection, Mechanisms and Their Impacts on the Coral Reef Ecosystem</p>	<p>SUGA Toshio (Japan)</p>	<p>Professor, Graduate School of Science, Tohoku University</p>	<p>This collaborative research aims to detect Marine Heat Waves (MHWs), which are phenomena of abnormally high sea water temperatures, in the western Pacific, and to elucidate their generation mechanisms and impacts on coral reef ecosystems.</p> <p>The Indonesian team will mainly conduct detailed detection of MHWs using high resolution sea surface temperature data from satellites, the Japanese team will mainly work on elucidating the generation mechanisms of the detected MHWs from the aspect of physical processes in the atmosphere and ocean, and the Filipino team will mainly work on elucidating the impacts of MHWs on coral reef ecosystems.</p> <p>The joint research by the teams in the three countries is expected to seamlessly promote the detection of MHWs, elucidation of their mechanisms, and evaluation of their impacts on coral reef ecosystems according to the characteristics of each region, and to advance the understanding of MHWs and their impact that meets the needs of each region.</p>
	<p><u>Anindya,</u> <u>Wirasatriya</u> (Indonesia)</p>	<p>Associate Professor, Faculty of Fisheries and Marine Science, Diponegoro University</p>	
	<p>Maria Vanessa, Baria Rodriguez (Philippines)</p>	<p>Assistant Professor, Marine Science Institute, University of the Philippines</p>	

Underlined: Lead Principal Investigator

Project Title	Principal Investigators	Position and Institution	Abstract of Research Project
<p>Construction of carbon recycling systems to produce alternative fish oil and its application for producing health-beneficial aquacultural and poultry products.</p>	<p><u>NAKAI Satoshi</u> (Japan)</p>	<p>Professor, Graduate School of Advanced Science and Engineering, Hiroshima University</p>	<p>This collaborative research aims to realize the scenario where thraustochytrids producing PUFAs such as DHA and EPA are cultured using food and beverage processed waste and wastewater and the thraustochytrid biomass (TB) is utilized to produce aquacultural and poultry products.</p> <p>Each team will isolate thraustochytrid strains, find the culture conditions to accelerate PUFAs production and construct a cultivation process using unsterile food and beverage-processed waste and wastewater. The Japanese team will elucidate mechanisms on the accelerated PUFAs production and apply the TB for production of poultry products. The Indonesian team will produce PUFAs extract and biogas from the TB and apply the extract for breeding shrimp. The Filipino team will apply the TB itself for breeding juvenile fish and shrimp.</p> <p>Through this collaborative and complementary research by all teams, we will accelerate implementation of a scenario of the production of alternative fish oil using thraustochytrids.</p>
	<p>Soeprijanto (Indonesia)</p>	<p>Professor Industrial Chemical Engineering, Institut Teknologi Sepuluh Nopember</p>	
	<p>Veronica Migo (Philippines)</p>	<p>Professor, Chemical Engineering, University of the Philippines Los Baños</p>	

Underlined: Lead Principal Investigator

## Appendix 3: The funding agencies which joined the call

## Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)

Country Name	Funding Agency Name
Japan	Japan Science and Technology Agency (JST)
Indonesia	Ministry of Education, Culture, Research and Technology (DIKBUDRISTEK)
Philippines	Department of Science and Technology (DOST)
Singapore	Agency for Science, Technology and Research (A*STAR)
Thailand	Program Management Unit for Human Resources & Institutional Development, Research and Innovation (PMU-B)

## Environment (Marine Science and Climate Change)

Country Name	Funding Agency Name
Japan	Japan Science and Technology Agency (JST)
Indonesia	Ministry of Education, Culture, Research and Technology (DIKBUDRISTEK)
Philippines	Department of Science and Technology (DOST)

Ministry of Education, Culture, Research and Technology (DIKBUDRISTEK), Indonesia

URL: <https://dikti.kemdikbud.go.id/>

Department of Science and Technology (DOST), Philippines

URL: <http://pcieerd.dost.gov.ph/>

Agency for Science, Technology and Research (A\*STAR), Singapore

URL: <https://www.a-star.edu.sg/>

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

URL: <https://www.nxpo.or.th/B/>

## Appendix 4: Experts for evaluation (JST)

## Materials (Materials Informatics and Advanced Material Research by Utilizing Computers)

Member Name	Position and Institution	Note
TAMADA Kaoru	Vice President, Kyushu University / Chief Professor, Institute of Leading Materials Chemistry	Program Officer
MOURI Tetsuo	Professor Emeritus, Hokkaido University	Advisor
OKABE Tomonaga	Professor, Graduate School of Engineering, Tohoku University	Advisor
Xu Yibin	Deputy Director, Research and Services Division of Materials Data and Integrated System, National Institute for Materials Science	Advisor
OGUCHI Tamio	Professor, Graduate School of Engineering Science, Osaka University	Advisor

## Environment (Marine Science and Climate Change)

Member Name	Position and Institution	Note
HIJIOKA Yasuaki	Deputy Director, Center for Climate Change Adaptation, National Institute for Environmental Studies	Program Officer
TABETA Shigeru	Professor, Graduate School of Frontier Sciences, The University of Tokyo	Advisor
FUJIEDA Shigeru	Professor, Regional Co-Creation Center for Industry and Society, Kagoshima University.	Advisor
SAKODA Kiyoshi	Professor, The Open University of Japan	Advisor
SASAKI Keiko	Professor, Faculty of Engineering, Kyushu University	Advisor
NAKATA Kaoru	Executive Director, Japan Fisheries Research and Education Agency	Advisor
TAKEYAMA Haruko	Professor, Faculty of Science and Engineering, Waseda University	Advisor
MAKINO Mitsutaku	Professor, Atmosphere and Ocean Research Institute, The University of Tokyo	Advisor
MIMURA Nobuo	Specially Appointed Professor, Global and Local Environment Co-creation Institute (GLEC), Ibaraki	Advisor

	University	
SAKURAI Gen	Principal Researcher, Institute for Agro-Environmental Sciences, National Agriculture and Food Research Organization	Advisor
FUJII Masahiko	Associate Professor, Faculty of Environmental Earth Science, Hokkaido University	Advisor

Annex: Abstract of the joint call for proposals

(1) Proposal field application requirements:

In addition to the Japanese team, the project consortium must include members from a minimum of two different countries listed as participating in the call.

(2) Applicant eligibility (Japan side):

Any independent researcher personally affiliated with (and actively conducting research at) a domestic Japanese research institution, regardless of nationality, is eligible to apply.

(3) Research period:

3 years (36 months)

(4) Amount of funding (JST):

Up to 35.1 million yen from JST to the researchers (Japan-based team) per project over three years, inclusive of overhead costs (30 percent of direct costs).

(5) Evaluation method:

Based on evaluation by experts from the countries which held the joint call, including Japan, and discussion by JST and other funding agencies.

(6) Evaluation criteria (JST):

The following were among the general criteria considered in the evaluation process:

- 1) Conformity with e-ASIA JRP aims such as regional relevance and designated research fields
- 2) Capability of the research leaders and relevance of their current research activities
- 3) Effectiveness and synergistic mutual benefit of the joint research activities
- 4) Validity of the research plan
- 5) Effectiveness and continuity of exchange
- 6) Validity of the exchange plan