JST Press Release #1527

October 11, 2021

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

JST to fund five research projects for Advanced Materials under the Strategic International Collaborative Research Program (SICORP) framework

The Japan Science and Technology Agency (JST) has decided to fund five projects under the theme of Advanced Materials as a part of the Strategic International Collaborative Research Program (SICORP[1]) (Appendix 1).

Through this call JST is funding research in advanced materials jointly with funding organizations from Visegrad Group (V4) countries[2] (Appendix 2).

The call saw a total of 42 proposals submitted, out of which 5 were selected for funding following an expert evaluation and consultation with participating partner funding agencies (Appendix 3, 4).

The research period is scheduled to last for three years.

1) SICORP: https://www.jst.go.jp/inter/english/
2) Czech Republic, Hungary, Poland, Slovakia

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Contact

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Appendix 1

List of Awarded Projects

Project Title		Principal Investigators Position and Institution (Country)	Project Abstract
1	Black metals decorated with surface receptors as high-potentiality materials for gas sensing	KAWAMURA Midori Professor, Faculty of Engineering, Kitami Institute of Technology (Japan)	This collaborative research aims to develop low-cost and highly sensitive sensors for NO_X and organic nitrate detection at room temperature by incorporating Black Metals (BM) films decorated with receptors of organic substances and 2D materials that can selectively adsorb gases. Specifically, the Japan team will fabricate and characterize the BM films and develop a new fabrication process, the Czech team will process the BM films by laser, deposit the receptors (organic and 2D materials) on the BM films, and evaluate the sensor performance. The Slovakia team will evaluate the mechanical properties of the BM films and synthesize 2D materials. The Hungary team will evaluate the BM films by various structural and compositional analyses. The Poland team will synthesize organic molecules that are not commercially available and are suitable for receptors with high gas selectivity. By combining the five countries' technologies in manufacturing, synthesis, evaluation and analysis, it becomes possible to realize a new high-performance sensor that will be used for environmental monitoring and explosive marker detection. This will contribute toward maintaining a safe and secure society.
		Přemysl FITL Assistant Professor, Department of Physics and Measurements, University of Chemistry and Technology Prague (Czech Republic)	
		Matej MIČUŠÍK Senior Research Scientist, Department of Composite Materials, Polymer Institute of Slovak Academy of Sciences (Slovakia)	
		Gabriela DYRDA Assistant Professor, Faculty of Chemistry, University of Opole (Poland)	
		Tamás FODOR Research Associate, Laboratory of Materials Science, Institute for Nuclear Research (ATOMKI) (Hungary)	

Project Title		Principal Investigators Position and Institution (Country)	Project Abstract
2	Development of Advanced Magnesium Alloys for Multifunctional Applications in Extreme Environments	KAWAMURA Yoshihito Director/Professor, Magnesium Research Center, Kumamoto University (Japan)	The main goal of this project is to develop next-generation Mg alloys with long-period stacking ordered (LPSO) structure and other Mg alloys to meet the demands for greater mechanical performance, nonflammability and applicability in the human body. The consortium consists of a synergistic team with complementary expertise. Specifically, the Japan team will conduct alloy and processing design and multiscale modeling. The Slovakia team will develop protective coating deposition methods. The Poland team will model, fabricate and characterize biomedical devices. The Czech team and the Hungary team will elucidate deformation behavior of LPSO-type Mg alloys. Through the joint research by the team of these five universities and research institutions, each with a deep knowledge of Mg alloys and high capabilities in experiments and analysis, it's expected that high-performing next-generation Mg alloys that can endure long-term use in extreme environments will be successfully developed. For Japan and the V4 countries these research results could help stimulate a transition to new materials in a wide range of fields, contributing to structural materials and medical devices that will help achieve the Sustainable Development Goals.
		Kristián MÁTHIS Professor, Faculty of Mathematics and Physics, Charles University (Czech Republic)	
		Wojciech ŚWIESZKOWSKI Professor Head of Division of Materials Design, Faculty of Materials Science and Engineering, Warsaw University of Technology (Poland)	
		Jenő GUBICZA Professor, Department of Materials Physics, Eötvös Loránd University (Hungary)	
		František LOFAJ Senior/Leading Researcher, Institute of Materials Research, Slovak Academy of Sciences (Slovakia)	

Project Title		Principal Investigators Position and Institution (Country)	Project Abstract
3	Band-gap engineering in unconventional semiconductors	KITAURA Ryo Associate Professor, Department of Chemistry, Nagoya University (Japan)	This collaborative research aims to explore advanced optical materials through crystal and defect engineering towards single photon emitters working at room temperature and wavelengths in the near infrared telecommunication and bio imaging window. Specifically, the Japan team will design prototype optoelectronic devices such as light-emitting diodes based on advanced luminescent crystals to be synthesized. The Czech team will evaluate luminescence lifetime and photon statistics. The Slovakia team will synthesize doped diamonds and identify the lattice defects using transmission electron spectroscopy. The Hungary team will study the nature of defects by spin resonance methods. The Poland team will conduct the first principle calculations for predicting, understanding and complementing the experimental results. Though this collaborative research among the five countries, the developed photon emitters working at wavelengths in the near infrared telecommunication and bio-imaging windows will be applied for quantum cryptography communication which makes eavesdropping theoretically impossible and high-contrast bioimaging which helps early detection of cancers. This should eventually contribute to the foundation of an advanced information society despite population aging.
		SHIOZAWA Hidetsugu Project Leader, Department of Low-dimensional Systems, J. Heyrovsky Institute of Physical Chemistry (Czech Republic)	
		Viera SKAKALOVA Senior Scientist, Slovak Academy of Sciences (Slovakia)	
		Ferenc SIMON Professor, Department of Physics, Budapest University of Technology and Economics (Hungary)	
		Marcin KURPAS Associate Professor, Institute of Physics, University of Silesia in Katowice (Poland)	

Project Title		Principal Investigators Position and Institution (Country)	Project Abstract
4	Perovskites Quantum Dots based Broadband Detectors - from a quantum dot to a functional detector	CHIBA Takayuki Assistant Professor, Graduate School of Organic Materials Science, Yamagata University (Japan)	The main objective of the project is to study the perovskite quantum dots (PeQDs) as an active medium for direct broadband detectors with high sensitivity in the X-ray spectral region. Specifically, the Japan team is responsible for surface modification and high density film of PeQDs. The Czech team will study functionalization of low-dimensional carbon-based materials. The Poland team will conduct PeQDs synthesis by mechanochemistry. The Hungary team will study charge carrier dynamics at PeQD layer interfaces. The Slovakia team is responsible for device characterization under X-ray irradiation. The international collaboration by five different research groups creates a platform for sharing and consolidating their existing expertise in PeQDs synthesis, preparation and characterization of PeQDs-based photovoltaic and photodetective structures. This is expected to realize a low-cost, highly-sensitive PeQDs-based X-ray detector reducing risk of radiation exposure for medical and security X-ray imaging applications.
		Martin KALBÁČ Associate Professor, Department of Low-dimensional Systems, J. Heyrovsky Institute of Physical Chemistry (Czech Republic)	
		Daniel PROCHOWICZ Group Leader, Institute of Physical Chemistry, Polish Academy of Sciences (Poland)	
		Gergely Ferenc SAMU Senior Researcher, Ultrafast Dynamics in Semiconductors, University of Szeged (Hungary)	
		Peter ŠIFFALOVIČ Group Leader, Institute of Physics, Slovak Academy of Sciences (Slovakia)	

	Project Title	Principal Investigators Position and Institution (Country)	Project Abstract
5	Atomic design of carbon-based materials for new normal society	NISHIHARA Hirotomo Professor, Advanced Institute for Materials Research, Tohoku University (Japan) Amrita JAIN Research Assistant, Institute of Fundamental Technological Research, Polish Academy of Sciences (Poland) Monika MICHALSKA Researcher, Department of Chemistry, VŠB-Technical University of Ostrava (Czech Republic) Eva SCHOLTZOVÁ Researcher, Institute of Inorganic Chemistry, Slovak Academy of Sciences (Slovakia) Tamás SZABÓ Assistant Professor, Faculty of Science and Informatics, University of Szeged (Hungary)	This collaborative research aims to develop high-performance carbon-based materials which are crucial to realize a new normal society. Specifically, the Japan team will synthesize new carbon-based materials by atomic-level structure design and controlling. The Czech team will synthesize advanced carbon-based composite materials. The Hungary team is responsible for comprehensive characterization at the atomic/molecular/colloidal scale. The Slovakia team is responsible for creating representative and functioning models for carbon-based materials. The Poland team is responsible for developing ionic liquid-based polymer electrolytes and testing for structural supercapacitor applications. Through the close collaborations among the five international teams, development of atomically designed and controlled high-performance carbon-based materials and their composites will be pursued. The materials thus developed are expected to be used for important applications towards new normal society, such as COVID-19 filters, rechargeable batteries, supercapacitors, energy conversion, gas storage, resource circulation, and ubiquitous devices.

Appendix 2

Call Outline

(1) Application Requirements
Each project consortium should consist of at least three members: one from Japan and two from two different V4 countries participating in the Joint Call.

(2) Applicant Eligibility (JST)
Any independent researcher affiliated with and actively conducting research at a domestic Japanese research institution, regardless of nationality, is eligible.

(3) Research Period
The research period is expected to last from October 2021 until September 2024.

(4) Amount of Funding (JST)
Up to 18 million yen per project (JST-funded side), inclusive of overhead costs (30 percent of direct costs).

(5) Evaluation Method
Proposals are evaluated online by a Scientific Committee formed by the participating countries, including a peer from a non-participating country.

(6) Evaluation Criteria
1) Scientific excellence of the project and the project partners.
   a. Sound concept and quality of objectives.
   b. Originality, innovative character, uniqueness of the research idea.
   c. Scientific track–record of the partners/publications in scientific journals.
   d. Scientific standing of the organisation the applicants belong to.

2) Methodology and work plan.
   a. Appropriateness and effectiveness of the methodology.
   b. Feasibility of the work plan (in relation to governance, adequate budget, resources, time schedule, infrastructure).

3) Expected impact of project results.
   a. Impact of the project on the scientific field/community.
   b. Expected application of the results.

4) Added value of multilateral cooperation.
   a. Level of the collaborative interaction between project partners.
   b. Added value of the international project consortium.
   c. Sustainability of the expected collaboration.
   d. Interdisciplinarity.
   e. Involvement of early-career researchers and gender balance.

Appendix 3

List of Participating Funding Organizations

Country/ Group	Funding Organization
Japan	Japan Science and Technology Agency (JST)
Czech Republic	Ministry of Education, Youth and Sports of the Czech Republic (MEYS)
Hungary	National Research, Development and Innovation Office of Hungary (NKFIH)
Poland	National Centre for Research and Development of Poland (NCBR)
Slovakia	Slovak Academy of Sciences (SAS)
Visegrad Group	International Visegrad Fund (IVF)

Appendix 4

List of Evaluators

Country	Name/Position/Affiliation	Role
Netherlands	Marcel VAN DE VOORDE Professor, University of Technology Delft	Chair
Japan	MORI Hatsumi Professor/Director, Institute for Solid State Physics, The University of Tokyo	Evaluator
Czech Republic	Jan ŠAFANDA Senior Researcher, Institute of Geophysics, Czech Academy of Sciences	Evaluator
Hungary	Árpád Bence PALOTÁS Professor/Dean, Faculty of Materials Science and Engineering, University of Miskolc	Evaluator
Poland	Anna DOBRZAŃSKA-DANIKIEWICZ Professor, Faculty of Mechanical Engineering, University of Zielona Góra	Evaluator
Slovakia	Karol FRÖHLICH Senior Researcher Institute of Electrical Engineering, Slovak Academy of Sciences	Evaluator