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Japan Science and Technology Agency (JST)
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JST to Fund 6 Projects in EIG CONCERT-Japan within the Framework of the Strategic International Collaborative Research Program (SICORP)

JST (President, Hamaguchi Michinari) has approved funding new joint research project in the research field of “Sustainable Hydrogen Technology as Affordable and Clean Energy”, in collaboration with 14 funding agencies from 13 European countries in the framework of the EIG CONCERT-Japan under SICORP *1 (Attachment 1,2).

EIG CONCERT-Japan is an international joint initiative to support and enhance science, technology and innovation (STI) cooperation between Japan and European countries (Attachment 3).

In 2021, the eighth Joint Call was conducted from May 10 to July 9 in the research field of “Sustainable Hydrogen Technology as Affordable and Clean Energy”, to which a total of 32 proposals was submitted. Following in depth evaluation by the Science Committee Meeting (Attachment 4) and subsequent discussion among funding agencies that participated in the Joint Call, it has been decided that JST will jointly fund the 6 projects. The period of support is to last for 3 years, during which Japanese researchers in each project receive up to 18 million JPY in total.

*1 EIG CONCERT-Japan:
The CONCERT-Japan was funded by the European Union (EU) as one of their international cooperation activities within the ERA-NET (European Research Area Network) of the Seventh Framework Programme for Research and Technology Development (FP7). Its continuation, the EIG CONCERT-Japan project, aims to further develop existing cooperation between European countries and Japan by promoting and enabling effective collaboration in science and technology research. (http://concert-japan.eu/)

Attachments

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Annex: Overview of the EIG CONCERT-Japan Joint Call on “Sustainable Hydrogen Technology as Affordable and Clean Energy”

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Attachment 1

EIG CONCERT-Japan
Projects Selected for Funding (2021)

	Title	Researcher Country/Name/Affiliation/ Position	Research Abstract
1	Ammonia hydrogen combustion in micro gas turbines (ADONIS)	Japan Yong FAN National Institute of Advanced Industrial Science and Technology, Senior Researcher	The project Adonis aims to enable ammonia utilization in micro gas turbines for distributed carbon-free power generation. The project will produce a state-of-the-art assessment of the micro gas turbine cycle performance (Work Package: WP1) underpinned by three constitutive building blocks that address three important open questions of fundamental scientific nature. These are: flame-wall interaction in ammonia/hydrogen flames (Work Package: WP2), thermoacoustic characteristics of ammonia/hydrogen flames (Work Package: WP3) and fuel injection optimization, mixture preparation and ignition (Work Package: WP4). AIST[*1] was the first in the world to demonstrate 50kW gas turbine power generation with 100% ammonia fuel. UT[*2]/AIST also pioneered in developing radical quenching models to describe the flame-wall interactions. AIST will work closely with UT on the experiments of WP2 and WP3, using NH_3/H_2 micro-flame setups. European side will perform GT combustor simulations and cycle analysis of WP1 (IFPEN[*3]/SUT[*4]), numerical simulations of WP2 (SINTEF) and WP3 (ZHAW[*5]) in support of experiments in Japan, and WP4 (UORL[*6]). *1: Advanced Industrial Science and Technology, Japan *2: The University of Tokyo, Japan *3: IFP Energies Nouvelle, France *4: Silesian University of Technology, Poland *5: Zurich Applied University of Sciences,
		France Vivien ESNAULT IFP Energies Nouvelles Hydrogen R&D Project Manager	
		Norway Andrea GRUBER SINTEF Senior Researcher	
		Switzerland Mirko BOTHIEN Zurich Applied University of Sciences Professor	
		Poland Andrzej SZLĘK Silesian University of Technology Professor	

			Switzerland *6: University of Orleans, France
2	Structure-based metabolic engineering of algal H_2 production (H2M)	Japan Genji KURISU Osaka University Professor	This proposal will follow a novel approach to biological H_2 production, in that the project team aim to transfer the H_2 metabolism that is naturally present in the chloroplasts of eukaryotic microalgae to their mitochondria. Separating H_2 production from photosynthesis will allow the cells to grow photosynthetically during the day, and to employ stored carbon for sustained dark-fermentative H_2 production in the night, thereby forming intrinsic H_2 storage facilities. European and Japanese partners bring in their complementary expertise in algal cell biology and genetics, biochemistry and biophysics of our target proteins, and state-of-the-art structural biology. The former will be provided by our European partner, with whom Japan team have been collaborating on green algae and thermophilic cyanobacteria for several years, and the latter will be done by Japan team. Within this project, elucidating the structures of our target protein complexes will enable a knowledge-driven optimization of the key players in the cells.
		Germany Thomas HAPPE Ruhr University Bochum Professor	
		France Nicolas ROUHIER Université de Lorraine Professor	
		Belgium* Remacle CLAIRE Université de Liège Professor	
3	Towards Safe Storage and Transportation of Cryogenic Hydrogen (STACY)	Japan Hirohisa TANAKA Kwansei Gakuin University Professor	The world is aiming for decarbonization while increasing the ratio of renewable energy. In order to store surplus energy from fluctuating energy sources and use it on demand, the storage technology is required. Large-scale storage and transportation of liquefied hydrogen (LH_2) is dense and economical, and can be expected to play a fundamental role in the realization of a hydrogen society. However, the knowledge about the potential risk of cryogenic hydrogen is insufficient. Japanese team designs a hydrogen
		Germany Ernst-Arndt REINECKE Forschungszentrum Juelich GmbH Head of the Safety Research Department	

		France Nabiha CHAUMEIX Centre National de la Recherche Scientifique - Institut de Combustion, Aérothermique, Réactivité et Environnement Deputy-Director	recombination catalyst, and evaluates the catalytic activity at extremely low temperatures, especially after being exposed to adverse conditions (oxidation and humidity) for a long period of time. German team supervise research and large-scale catalyst evaluation, and French team is in charge of risk evaluation and safety scenario formulation, evaluation of hydrogen combustion, and collection of legal information. We aim to contribute to the technology for storage and transportation safety of LH_2.
		France Ahmed BENTAIB Institut de Radioprotection et de sûreté Nucléaire, Expert	
4	Japanese-European Research Collaboration of New Affordable and Durable Electrocatalysts for Fuel Cells (NADC-FC)	Japan Katsuyoshi KAKINUMA University of Yamanashi Professor	The multilateral NADC-FC cluster will develop new affordable and highly active electocatalysts by depositing Pt-based nanoparticles on functionalized carbon and oxide support materials to catalytically accelerate the electro-reduction of oxygen for polymer electrolyte fuel cells, while the PGM content is further reduced. The combination of various electrochemical set-up arrangements ranges from rotating ring disk electrode (RRDE) (TU Braunschweig; TU-BS/GER), gas diffusion electrode (GDE) (University of Bern; UoB/SUI) and single cell using a fuel cell test station (University of Yamanashi; UoY/JPN). Each section carries out an accelerating stress tests for transferring the performance of here- developed electrocatalysts to the technically relevant catalyst-coated membrane (CCM) in a fuel cell system. UoY also evaluates the new catalysts during stress tests by operando analysis by use of synchrotron radiation and before/after stress tests by latest evaluation systems of microscopy and X-ray photoemission spectroscopy.
		Germany Mehtap ÖZASILAN Technische Universität Braunschweig Professor	
		Switzerland Arenz MATTHIAS University of Bern Professor	

5	Sustainability development and cost-reduction of hybrid renewable energies powered Hydrogen stations by risk-based multidisciplinary approaches (SUSHy)	Japan Toshiyuki YAMAMOTO Nagoya University Professor	The objective of this study is to develop risk-based philosophy and a new integrated approach to improve safety, public acceptance, and economic sustainability of the hydrogen fueling stations. Japanese team investigates the public acceptance of hydrogen stations considering knowledge of hydrogen technology, risk perception, benefits, environmental consciousness, travel behavior, and social interaction, Turkish team evaluates economically the hydrogen stations considering the probabilistic hydrogen load demand, and uncertain power of renewable energies, Polish team develops a framework to identify typical and atypical accident scenarios for hydrogen systems, Spanish team identifies key safety performance indicators, and Norwegian team develops a probabilistic digital twin to analyze the effectiveness and performance of the system under uncertainty. The research findings are expected to contribute the promotion of safe and economically sustainable hydrogen fueling stations by developing the guidance including safety assurance at the development and operation of hydrogen fueling stations.
		Norway Nicola PALTRINIERI Norwegian University of Science and Technology Associate Professor	
		Poland Andrzej RUSIN Silesian University of Technology Professor	
		Turkey Murat GÖKÇEK Nigde Ömer Halisdemir University Professor	
		Spain Marta MAROÑO Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas Senior Researcher	
6	Enhancement of Hydrogen Storage Properties of AlTiVCr Light Weight High	Japan Nobuhiro TSUJI Kyoto University Professor	The present international project aims to develop novel light-weight hydrogen storage AlTiVCr high entropy alloy (HEA) with lower desorption enthalpy, higher H/M ratio and faster kinetics by the addition of Ti_3C_2 MXene and nano-

	Entropy Alloys (HEA) by Ti_3C_2 MXene and Severe Plastic Deformation (EHSAL)	Czech Ludmila KUČEROVÁ University of West Bohemia Associate Professor	crystallization through severe plastic deformation (SPD). The Japan team applies severe plastic deformation (SPD) to the bulky AlTiVCr HEA including Ti_3C_2 MXene particles fabricated and provided by the European team for making the alloy nanostructured polycrystal, and quantitatively evaluate its nanostructure by transmission electron microscopy and other techniques. The European team organized by Czech scientists fabricates bulky composite of AlTiVCr and Ti_3C_2 MXene by powder metallurgy, evaluates hydrogen storage properties, conducts structural analysis and clarifies the mechanism through comparing the properties with the nanostructural parameters. The blend of this international collaboration using specialties of each scientist would realize the new-class of hydrogen storage material with superior properties through novel alloy and structure design.
		Slovakia Karel SAKSL Slovak Academy of Sciences Associate Professor	

* Project Leaders are underlined

* Researcher in Belgium

Researchers/research teams from countries/regions not participating in this EIG CONCERT-Japan Joint Call may participate as additional partners in a project consortium if they can prove that they have secured funding from other sources that allows them to fulfil their obligations within the consortium.

Attachment 2

EIG CONCERT-Japan

Funding Organizations that Participated in the hydrogen energy Joint Call

Country	Funding Organization
Japan	Japan Science and Technology Agency (JST)
Switzerland	Swiss National Science Foundation (SNSF)
Spain	National State Agency (AEI)
Slovakia	Slovak Academy of Sciences (SAS)
Czech Republic	Czech Academy of Sciences (CAS)
Czech Republic	Ministry of Education, Sports, Youth and Science (MEYS)
Germany	Federal Ministry of Education and Research (BMBF)
Turkey	The Scientific and Technological Research Council of Turkey (TUBITAK)
Norway	The Research Council of Norway (RCN)
Hungary	National Research, Development and Innovation Office (NKFIH)
France	Agence Nationale de la Recherche (ANR)
Bulgaria	Bulgarian National Science Fund (BNSF)
Poland	National Centre for Research and Development (NCBR)
Lithuania	Agency for Science, Innovation and Technology (MITA)

Attachment 3

EIG CONCERT-Japan

Partner Institutions

The CONCERT-Japan consortium is made up of the following 12 partners from 10 European countries and Japan:

Country	Partner Institution
Japan	Japan Science and Technology Agency (JST)
Spain	National State Agency (AEI)
Slovakia	The Slovak Academy of Sciences (SAS)
Czech Republic	Czech Academy of Sciences (CAS)
Czech Republic	Ministry of Education, Youth and Sports (MEYS)
Turkey	The Scientific and Technological Research Council of Turkey (TUBITAK)
Norway	The Research Council of Norway (RCN)
France	The National Center for Scientific Research (CNRS)
France	Agence Nationale de la Recherche (ANR)
Bulgaria	Bulgarian National Science Fund (BNSF)
Poland	National Centre for Research and Development (NCBR)
Lithuania	Agency for Science, Innovation and Technology (MITA)

Attachment 4

EIG CONCERT-Japan

Science Committee Members that Participated in the hydrogen energy Joint Call

Country	Name	Affiliation	Role
Japan	Prof. Mizuki Tada	Nagoya University	Chair
Bulgaria	Prof. Plamen Petkov	Bulgarian Academy of Sciences	Member
Czech Republic	Dr. Antonín Fejfar	Institute of Physics of the Academy of Sciences	Member
France	Prof. Hubert Girault	École Polytechnique Fédérale de Lausanne	Member
Japan	Prof. Kazunari Domen	University of Tokyo	Member
Lithuania	Dr. Laurencas Raslavičius	Kauno technologijos universitetas	Member
Norway	Dr. Trygve Riis	The Research Council of Norway	Member
Slovakia	Dr. Júlia Kotulová	Slovak Academy of Sciences	Member
Spain	Prof. Pedro Rodríguez Cortés	University Loyola	Member
Switzerland	Prof. Robert Steinberger-Wilckens	University of Birmingham	Member
Turkey	Prof. Gülfeza Kardas	Çukurova University	Member

Annex

Overview of the EIG CONCERT-Japan Joint Call on "Sustainable Hydrogen Technology as Affordable and Clean Energy"

1. Prospective Applicants

Researchers are required to form consortia which must include partners from Japan and at least 2 European countries. Research leaders are required to possess adequate insight and experience to effectively implement their proposed joint research during their research period.

2. Evaluation Process

Proposals were subjected to evaluation by online peer review and an evaluation committee made up of members selected by funding agencies which participates in the Joint Call. The participating funding agencies then met to decide on project selection, which was based on discussion of the results of that comprehensive evaluation.

3. Evaluation Criteria

- Scientific excellence
  - Sound research concept and quality of objectives
  - Ambition, innovative potential and uniqueness of the research idea
  - Scientific track–record, potential of the partners (including publications in scientific journals)
  - Scientific standing of the organizations the applicants belong to

- Impact of project results
  - Impact of the project on the scientific field, community
  - Contribution to enhancing innovation capacity and integration of new knowledge
  - Expected exploitation and dissemination of the results
  - Added value of the multilateral project consortium

- Implementation
  - Quality and effectiveness of the methodology
  - Feasibility of the work plan (in relation to governance, adequate budget, resources, time schedule)
  - Collaborative interaction and complementarity of project partners
  - Expected sustainability of the collaboration
  - Interdisciplinarity
  - Involvement of early-stage researchers and gender balance