

Collaborative Research Projects – 2020
Laboratory for Materials and Structures,
Institute of Innovative Research, Tokyo Institute of Technology

Outline and Application Instructions

1. Outline of the Projects *

The Collaborative Research Projects (hereafter, “CRP”) of the Laboratory for Materials and Structures (hereafter, “MSL”), Institute of Innovative Research, Tokyo Institute of Technology, include the following five different types of research and workshop to be carried out at MSL/ organized by MSL in collaboration with MSL faculties including Assistant, Associate, and Full Professors (hereafter, “MSL Faculties”).

International CRP (of Category A, B or C):

Research project conducted by a team consisting of MSL faculties and researchers of foreign organizations using the facilities, equipment, data, etc., available at MSL.

General CRP (of Category A, B or C):

Research project conducted by a team consisting of MSL faculties and researchers of other organizations, using the facilities, equipment, data, etc., available at MSL.

Topic-Specified CRP:

Research projects on one of the following topics coordinated by MSL faculties and conducted by a team consisting of MSL faculties and researchers of other organization, using the facilities, equipment, data, etc., available at MSL.

Specified Research Topics (Please see the abstracts of the topics on page 4.)

1. Establishment of thermal expansion tuning method by using giant negative thermal expansion materials
2. Elucidation and design of material functionalities based on computational and data science
3. Development of structural design method considering effects of repetitive loadings and oscillations
4. Development of life innovation materials
5. Development of New Functionalities in Abundant Element Materials

International Workshop:

Small-scale international discussion meeting on a focused topic to promote MSL CRP, organized by MSL.

Workshop:

Small-scale discussion meeting on a focused topic to promote MSL CRP, organized by MSL.

*** Award for Outstanding Researchers**

The MSL Award for Research will be presented to the outstanding researchers.

*** Financial Support for Conferencing**

MSL provides financial support for conferencing.

2. Qualified Applicants

Researcher with a doctoral or an equivalent who reasonably approves the agreements on intellectual property rights with MSL. (Please see Appendix 1. the Regulation on Intellectual Property Right yielded from MSL CRP on page 9.)

(Technical staff and postgraduate students may be a collaborator for CRP.)

Project representative may apply once for International or General CRP, and once for International Workshop or Workshop, at most.

3. How to apply

Prior to application, applicant should consult with MSL faculties regarding research subject, period, and expenses, etc.

General information of MSL including organizations, faculty members, and research abstracts, can be obtained in MSL website (<http://www.msl.titech.ac.jp/english.html>).

International CRP, General CRP and Topic-Specified CRP:

Applicant should submit an application form (use Form 1 attached) to the office for MSL CRP by e-mail (suishin@msl.titech.ac.jp). The application form can be downloaded from MSL website (http://www.msl.titech.ac.jp/english/msl_crp_en/crp_2020_en/application_forms_2020.html).

International Workshop and Workshop:

Applicant should submit an application form (use Form 2 attached) to the office for MSL CRP by e-mail (suishin@msl.titech.ac.jp). The application form can be downloaded from MSL website (http://www.msl.titech.ac.jp/english/msl_crp_en/crp_2020_en/application_forms_2020.html).

4. Period of Project

International CRP and General CRP:

About one year from April 10th 2020 to March 20th 2021

Research period may be extended up to a maximum of three years, provided that project representative of project should apply newly in each year.

International Workshop and Workshop:

Between April 10th 2020 to March 20th 2021

5. Research Expenses

Necessary expenses for the CRP or Workshop may be covered in accordance to the budget allocated.
(The airfare and public transportation fare are covered.)

6. Deadline of Application

January 10, 2020 (No application will be accepted later than the deadline.)

7. Selection and Notification

The decision shall be notified to each applicant (i.e. project representative) early in April, 2020.

8. Report of CRP / Workshop

After the completion of CRP or Workshop, representative of CRP or Workshop is required to submit “Report on CRP” or “Report on Workshop” to the office for CRP by e-mail (suishin@msl.titech.ac.jp).

The report should include a power point slide describing the results of CRP or Workshop.

9. Publication of Research Results and Others

In case of publishing the results of MSL CRP, please acknowledge the sponsorship for the collaborative research project provided by the Laboratory for Materials and Structures, and inform it to the office for MSL CRP.

Please use the following name(s), if necessary, in your acknowledgment.

- 1. Laboratory for Materials and Structures, Institute of Innovative Research, Tokyo Institute of Technology**
- 2. Collaborative Research Project of Laboratory for Materials and Structures, Institute of Innovative Research, Tokyo Institute of Technology**

Please note that the intellectual property rights yielded from MSL CRP are under the regulation of MSL, as stated in Appendix 1. For details of the regulation, please contact the office for MSL CRP.

10. Accommodation

Accommodations in Tokyo Institute of Technology are not available.

11. Where to submit and contact

Office for MSL Collaborative Research Projects
Laboratory for Materials and Structures,
Institute of Innovative Research, Tokyo Institute of Technology
R3-27 4259 Nagatsuta-cho, Midori-ku, Yokohama 226-8503, Japan
TEL: +81-45-924-5968 FAX : +81-45-924-5978
E-mail: suishin@msl.titech.ac.jp
URL: <http://www.msl.titech.ac.jp/english.html>

Abstracts of Topic-Specified Collaborative Research Projects

Establishment of thermal expansion tuning method by using giant negative thermal expansion materials

Representative: Masaki Azuma

There is a growing concern about displacement caused by thermal expansion, which is a critical issue in high-precision devices and equipment, such as optical devices, semiconductor manufacturing equipment, and space vehicles. Composite of resin and giant negative thermal expansion materials stemming from charge, orbital and spin degree of freedom of solid materials will be developed.

Elucidation and design of material functionalities based on computational and data science

Representative: Fumiyasu Oba

It is essential to investigate the atomistic and electronic structures of materials for their understanding and design as material functionalities originate from these microscopic structures. This project aims at elucidating the relationship between the structures and functionalities in electronic materials using computational approaches such as first-principles calculations and data-science approaches. In conjunction with experimental techniques such as spectroscopy and electron microscopy, we try to obtain and utilize information at the atomistic and electronic level for the design of novel materials.

Development of structural design method considering effects of repetitive loadings and oscillations

Representative: Daiki Sato

It has been known that there is a high possibility of a major Nankai Trough earthquake occurring in the future. A long-period seismic event such as Nankai Trough earthquake will cause tall buildings to oscillate for several times. As building safety technology, dampers are used in passive controlled buildings and seismic isolated building to dissipate earthquake energy. However, several repetitive loadings and oscillations affect damper performance. Aiming to develop advanced structural design of buildings, this research project experimentally and analytically examines damper performance, and the findings are incorporated in the analysis of building response.

Development of life innovation materials

Representative: Toshio Kamiya

Laboratory for Materials and Structures (MSL) has conducted a trans-university joint project for developing life innovation materials, which will contribute to resolve the current social issues such as energy, resources, environment, and medical, and consequently provide sustainable and comfortable life to us. For this purpose, MSL has developed original technology and materials by utilizing unconventional structures and functions in inorganic and metal materials. In this project, we will develop new materials and devices that will contribute to developing such life innovation materials by combining the MSL's materials & technology with other proposed ideas.

Development of New Functionalities in Abundant Element Materials

Representative: Hidenori Hiramatsu

This is not only important but also timely to develop new functionalities with abundant element systems. The functionalities that should be targeted mainly include electronics device functionalities. Bulk synthesis and film growth study, structural, electronic and magnetic characterization, and theoretical study are all relevant for the present project.

MSL faculties

Name, Extension Number and E-mail Address:

For calling from outside the campus, please dial +81-45-924- (Extension Number).

MSL Faculties	Extension	e-mail address
AZUMA Masaki	5315	mazuma@msl.titech.ac.jp
AZUMA Yasuo	5341	azuma@msl.titech.ac.jp
DAS Hena	5081	das.h.aa@m.titech.ac.jp
HAINDL Silvia	5128	haindl.s.aa@m.titech.ac.jp
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YAMAMOTO Takafumi	5360	yama@msl.titech.ac.jp
YASUI Shintaro	5626	yasui.s.aa@m.titech.ac.jp

**(Excerpt) Equipment Available for Collaborative Research
at the Laboratory for Materials and Structures
[MSL Faculties to contact]**

Equipment	Staff
High-pressure synthesis apparatus SQUID Magnetometer (MPMS ; Quantum Design) High pressure synthesis apparatus (250 ton-press) Physical Property Measurement System Under High Magnetic Field Atomic Force Microscopy System X-RAY DIFFRACTOMETER	AZUMA Masaki
Capillary gas chromatography High performance liquid chromatography	HARA Michikazu KAMATA Keigo
SQUID Magnetometer (MPMS ; Quantum Design) High-Resolution Solid-State NMR Spectrometer (BRUKER AVANCE III HD) Single-Crystal Four-Circle Diffractometer X-ray Powder Diffractometer ³ He- ⁴ He Dilution Refrigerator	KAWAJI Hitoshi
2000kN Dynamic Loading Actuator	KISHIKI Shoichi
DATA LOGGER TDS630, Tokyo Sokki Kenkyujo	KONO Susumu
Scanning Electron Microscope	MAJIMA Yutaka
Sub-10-fs time domain spectroscopy system Femtosecond time-domain spectroscopy system	NAKAMURA Kazutaka
Equipment for single crystals growth Equipment for physical properties evaluation under extreme conditions	SASAGAWA Takao
200tf Universal Testing Machine 500kN Temperature Variable High Rigidity Material Testing Machine Multi-Dimensional Long Stroke Loading System Reaction Frame (1000kN and 500kN Oil Jacks)	YAMADA Satoshi

* There is other equipment available for CRP.

Maximum budget for individual grants

Type of CRP	Category	Maximum Allocation	
		Travel	Materials and Supplies
International CRP	*A	¥ 1,000,000	¥ 400,000
	B	¥250,000	¥ 40,000
	C	¥ 150,000	¥ 30,000
General CRP	*A	¥ 650,000	¥ 400,000
	B	¥200,000	¥ 40,000
	C	¥ 100,000	¥ 30,000
International Workshop, Workshop		¥ 600,000	¥ 120,000

* Project representative may apply once for International or General CRP, and once for International Workshop or Workshop, at most.

Appendix 1: Regulation on Intellectual Property Right Yielded From MSL CRP

•Case of researchers who belong to universities

In general, the yielded right shall belong to the researcher or his/her institute/university. In case when the contributions from researchers of Tokyo Tech to the invention you are to file as an intellectual property are recognized to be significant, Tokyo Tech shall discuss with you the property right.

When you file patents and/or intellectual property rights yielded from MSL CRP, you shall provide us at the office for MSL CRP with a copy of the filing/filed documents. (The office for MSL CRP shall strictly storage the copy and keep the secrecy of your filing.)

•Case of those other than afore-defined

In general, the yielded right shall belong to the researcher (of this category) or his/her institute/company. In case when the contributions from researchers of Tokyo Tech to the invention you are to file as an intellectual property are recognized to be significant, Tokyo Tech shall discuss with you the property right.

When you file patents and/or intellectual property rights yielded from MSL CRP, you shall provide us at the office for MSL CRP with a copy of the filing/filed documents. Moreover, in case when profits from the utilization of the filing/filed intellectual properties are anticipated, Tokyo Tech shall discuss with the right holder the consideration of the utilized facility at Tokyo Tech. (The office for MSL CRP shall strictly storage the copy and keep the secrecy of your filing.)