Collaborative Research Projects – 2023
Joint Usage/Research Center Research Center for Advanced Inorganic Materials
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 or B):

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. Development of materials digital transformation approach and new electronic functional materials and devices
2. Dynamics of quantum superposition state in solids
3. Seismic Design for Functional Continuity of Building Structures
4. 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 (https://www.msl.titech.ac.jp/english.html).

International CRP, General CRP and Topic-Specified CRP:

Applicant should submit application forms (use Form 1 and Form1_(description) attached) to the office for MSL CRP by e-mail (suishin@msl.titech.ac.jp). The application form can be downloaded from MSL website (https://www.msl.titech.ac.jp/english/msl_crp_en/crp__en/application_forms 2023.html).

International Workshop and Workshop:

Applicant should submit application forms (use Form 2 and Form2_(description) attached) to the office for MSL CRP by e-mail (suishin@msl.titech.ac.jp). The application form can be downloaded from MSL website (https://www.msl.titech.ac.jp/english/msl_crp_en/crp_2023_en/application_forms 2023.html).

4. Period of Project

International CRP and General CRP:

About one year from April 10th 2023 to March 20th 2024

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 2023 to March 20th 2024

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 6, 2023 (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, 2023.

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.

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: https://www.msl.titech.ac.jp/english.html

Abstracts of Topic-Specified Collaborative Research Projects

Development of materials digital transformation approach and new electronic functional materials and devices

Representative: Toshio Kamiya

Combining data analysis as well as materials simulations and experimental materials research has become important to accelerate the development of new materials and devices. Thus, it is an urgent issue to build a new materials digital transformation system (MDX). In this project, we welcome ideas of a part of such MDX approach, its total design, or related issues.

Dynamics of quantum superposition state in solids

Representative: Kazutaka Nakamura

Quantum superposition states are unique to quantum mechanics and closely related to quantum coherence and entanglement, which are the basis of new quantum technologies such as quantum information and communication. However, the quantum superposition states rapidly lost in solids, and then ultrafast time-resolved measurements are required to elucidate their dynamics. In this research project, we will conduct time-domain spectroscopy on the quantum superposition states in electronic and phonon states using femtosecond optical pulses. We also investigate the dynamics using quantum theory.

Seismic Design for Functional Continuity of Building Structures

Representative: Shoichi Kishiki

Building structures are required to perform multiple roles, and in order to reduce economic losses due to earthquakes, it is necessary to establish seismic design for functionally continuity. In addition, it is necessary to clarify the seismic performances and damage state of not only structural members, but also non-structural components and building equipment to provide better performance. In this research, we will conduct experiments using dynamic actuator or bi-directional loading system on non-structural components and building equipment. Based on these results, seismic design to mitigate damage will be discussed.

Development of New Functionalities in Abundant Element Materials

Representative: Hidenori Hiramatsu

Development of new functionalities with abundant element systems is not only important but also timely. 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).
（Regarding the number marked with ＊, please dial +81-3-5734- (Extension Number).）

MSL Faculties	Extension	e-mail address
AZUMA Masaki	5315	mazuma@msl.titech.ac.jp
HANZAWA Kota	5134	K-hanzawa@mces.titech.ac.jp
HARA Michikazu	5311	mhara@msl.titech.ac.jp
HIRAMATSU Hidenori	5855	h-hirama@mces.titech.ac.jp
IDE Keisuke	5855/5325	keisuke@mces.titech.ac.jp
IKOMA Toshiyuki	*2519	tikoma@ceram.titech.ac.jp
ISHIHARA Tadashi	5484	ishihara.t.ai@m.titech.ac.jp
KAMATA Keigo	5338	kamata.k.ac@m.titech.ac.jp
KAMIYA Toshio	5357	tkamiya@msl.titech.ac.jp
KATASE Takayoshi	5855/5314	katase@mces.titech.ac.jp
KAWAJI Hitoshi	5313	kawaji@msl.titech.ac.jp
KISHIKI Shoichi	5332	kishiki.s.aa@m.titech.ac.jp
KITA Yusuke	5312	kita.y.ad@m.titech.ac.jp
KITANI Suguru	5370	kitani.s.aa@m.titech.ac.jp
KONO Susumu	5384	kono.s.ae@m.titech.ac.jp
MAJIMA Yutaka	5309	majima@msl.titech.ac.jp
MATSUSHITA Nobuhiro	*2875	matsushita.n.ab@m.titech.ac.jp
NAKAMURA Kazutaka	5387	nakamura@msl.titech.ac.jp
NISHIMURA Koshiro	5326	nishimura.k.ac@m.titech.ac.jp
NITTA Ryosuke	5376	nitta.r.ab@m.titech.ac.jp
OBA Fumiyasu	5511	oba@msl.titech.ac.jp
PRADHAN Sujan	5326	pradhan.s.aa@m.titech.ac.jp
SASAGAWA Takao	5366	sasagawa@msl.titech.ac.jp
SATO Daiki	5306	sato.d.aa@m.titech.ac.jp
SHEGAY Aleksey Vadimovich	5306	shegay.a.aa@m.titech.ac.jp
SHIGEMATSU Kei	5380	kshigematsu@msl.titech.ac.jp
TAKAHASHI Akira	5343	takahashi.a.bb@m.titech.ac.jp
YAMAMOTO Takafumi	5360	yama@msl.titech.ac.jp
YASUI Shintaro	*2906	yasui@lane.iir.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 appraratus 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 YAMAMOTO Takafumi
Capillary gas chromatography High performance liquid chromatography Electron Spectroscopy for Chemical Analysis Infrared Spectrometer	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 Heat capacity measurement system using relaxation method	KAWAJI Hitoshi
2000kN Dynamic Loading Actuator 200tf Universal Testing Machine 500kN Temperature Variable High Rigidness Material Testing Machine Multi-Dimensional Long Stroke Loading System Reaction Frame (1000kN and 500kN Oil Jacks) Load & Displacement Control System for Structural Experiments 1000kN hydraulic jack with 2 directional load cells	KISHIKI Shoichi
DATA LOGGER TDS630, Tokyo Sokki Kenkyujo Servo controlled static hydraulic pump and controlling units 4MN hydraulic jacks Concrete cylinder specimen end grinding machine	KONO Susumu
“Scanning Electron Microscope” Hitachi Regulus8230	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 Maskless Electronic Device Fabrication System	SASAGAWA Takao

Maximum budget for individual grants

Type of CRP	Category	Maximum Allocation	
		Travel	Materials and Supplies
International CRP	*A	¥ 1,000,000	¥ 400,000
	B	¥310,000	¥ 40,000
General CRP	*A	¥ 650,000	¥ 400,000
	B	¥140,000	¥ 100,000
	C	¥ 30,000	¥ 100,000
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.)