Collaborative Research Projects – 2015
Materials and Structures Laboratory, Tokyo Institute of Technology

Outline and Application Instructions

1. Outline of the Projects

The Collaborative Research Projects (hereafter, "CRP") of the Materials and Structures Laboratory (hereafter, "MSL"), 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").

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.

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.

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 multifunctional solid catalysts based on their structure control
2. Studies of the correlation between the Structure and Properties of Functional Materials
3. Development of seismic damage controlling structural systems for quick recovery
4. Development of unusual atomic structures in inorganic materials and related new functionalities
5. Development of New Functionalities in Abundant Element Materials

Workshop:

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

International Workshop:

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

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 General or International CRP, and once for Workshop or International 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).

General CRP, International CRP and Topic-Specified CRP:

Applicant should submit an application form (use Form 1 attached) to the office for 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/application_forms.html).

Workshop and International Workshop:

Applicant should submit an application form (use Form 2 attached) to the office for 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/application_forms.html).

4. Period of Project

General CRP, International CRP and Topic-Specified CRP:

About one year from April 10th 2015 to March 20th 2016

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

Workshop and International Workshop:

Between April 10th 2015 and March 20th 2016

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 30, 2015 (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, 2015.

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 power point slides 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 Materials and Structures Laboratory, and inform it to the office for CRP.

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

1. **Materials and Structures Laboratory, Tokyo Institute of Technology**
2. **Secure Materials Center, Materials and Structures Laboratory, Tokyo Institute of Technology**
3. **Structural Engineering Research Center, Tokyo Institute of Technology**
4. **Collaborative Research Project of Materials and Structures Laboratory, 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 CRP.

10. Accommodation

Accommodations in Tokyo Institute of Technology are not available.

11. Award Presentations to Outstanding Research Activities

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

12. Where to submit and contact

Office for Collaborative Research Projects
Materials and Structures Laboratory, Tokyo Institute of Technology
R3-27 4259 Nagatsuta, 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

Development of multifunctional solid catalysts based on their structure control

Representative: Keigo Kamata

Chemical industries leave much room for improvement from the standpoints of environmental conservation and efficiency of resource utilization, and thus developments of superior catalytic technologies are socially desirable. In order to create novel functional catalyst materials, it is very important to reveal and systematize the structure-activity relationships. In this project, inorganic solid catalysts with multifunctionalities (e.g., cooperative activation of substrates and reagents, stabilization of reaction intermediates, etc.) will be designed by strictly controlling their structures. We will focus on difficult chemical reactions which are strongly demanded in industry and academia.

Studies of the correlation between the Structure and Properties of Functional Materials

Representative: Hitoshi Kawaji

The correlation between the crystal structure and the physical properties of functional materials is studied to get the information for improvement of the properties of the existing functional materials, search and design of new compounds, and development of new functional materials. The basic experimental research on the high quality samples of the materials: insulators, semiconductors, superconductors, ferroelectric materials, magnetic materials, solid electrolytes, and so on will be carried out by measuring various physical properties and structure analysis. The theoretical studies on the basis of the computational science technique will be made in addition to the experimental studies to obtain the unified understanding of the bulk properties from atoms and molecules.

Development of seismic damage controlling structural systems for quick recovery

Representative: Susumu Kono

The fundamental concept of the Japanese 1981 building design law was to keep using buildings for minor to medium scale earthquakes and to prevent collapse and life losses for major scale earthquakes. Looking back damage of recent earthquakes in major cities worldwide, it has been recognized that minimizing damage for quick recovery has become an important performance criterion expected from the general public. In order to live up to the expectation, the project pursues structural systems which keep buildings functional after earthquakes so that quick recovery can be achieved for earthquakes. The project encourages not only base isolation and damping systems but also the ordinary strength resisting structures.

Development of unusual atomic structures in inorganic materials and related new functionalities

Representative: Toshio Kamiya

Chemical bonds in inorganic materials contain large contributions of covalent bonds with short-range interaction and ionic bonds with long-range interaction, and thus there are many inorganic crystals that have very long periodic structures in 0 – 3 dimensions. It is also expected that artificial control of ionic arrangements will alter local electrostatic potential largely, and thus leads to developing new functionalities. Further, recent works have revealed that strong iconicity is the origin of large mobility

in amorphous oxide semiconductors. These imply that the utilization and control of these unusual atomic structures will lead to development of new functional materials and devices. In this project, we will develop new materials and functionalities by designing, controlling, and employing such unusual structures in inorganic materials. The scope of the research project includes materials design, structure characterization, property measurements, development of new devices and applications, and so on.

Development of New Functionalities in Abundant Element Materials

Representative: Hideo Hosono

We are pleased to call for abstracts of MSL Collaborative Research Projects on “Development of New Functionalities in Abundant Element Materials”. It is not only important but also timely to develop new functionalities with abundant element systems, which is indeed one of the missions of our Center, Secure Material Center. The functionalities that should be targeted include electronics and ionics device functionalities and catalytic activities. Bulk synthesis and film growth study, structural, electronic and magnetic characterization, and theoretical study are all relevant for the present project.

Tokyo Institute of Technology:

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
AKATSU Takashi	5336	Takashi_Akatsu@msl.titech.ac.jp
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Equipment Available for Collaborative Research at the Materials and Structures Laboratory [MSL Faculties to contact]

Equipment	Staff
Powder Gun, Two-Stage Light Gas Gun, Three-Stage Light-Gas Gun Electron Probe Micro-Analyzer	ATOU
SQUID Magnetometer (MPMS ; Quantum Design)	KAWAJI
Physical Property Measurement System Under High Magnetic Field Visible and Near-Infrared Raman Spectrometer X-RAY DIFFRACTOMETER	ITOH
Atomic Force Microscopy System Micro-Raman Analyzer UV Raman Spectrometer	MATSUSHITA
Short-pulsed laser irradiation system Femtosecond time-domain spectroscopy system	NAKAMURA
High-pressure apparatus (cubic-anvil type)	SASAGAWA
Single-Crystal Four-Circle Diffractometer X-ray Powder Diffractometer	SASAKI
200tf Universal Testing Machine Multi-Dimensional Long Stroke Loading System 500kN Temperature Variable High Rigidness Material Testing Machine	YAMADA
Scanning Electron Microscope HITACHI S-4500 Transmission Electron Microscope	WAKAI･AKATSU

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

*Up to two projects are approved typically.

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 CRP with a copy of the filing/filed documents. (The office for 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 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 CRP shall strictly storage the copy and keep the secrecy of your filing.)