

Overview of International Collaboration Program at Global Institute for Materials Research Tohoku

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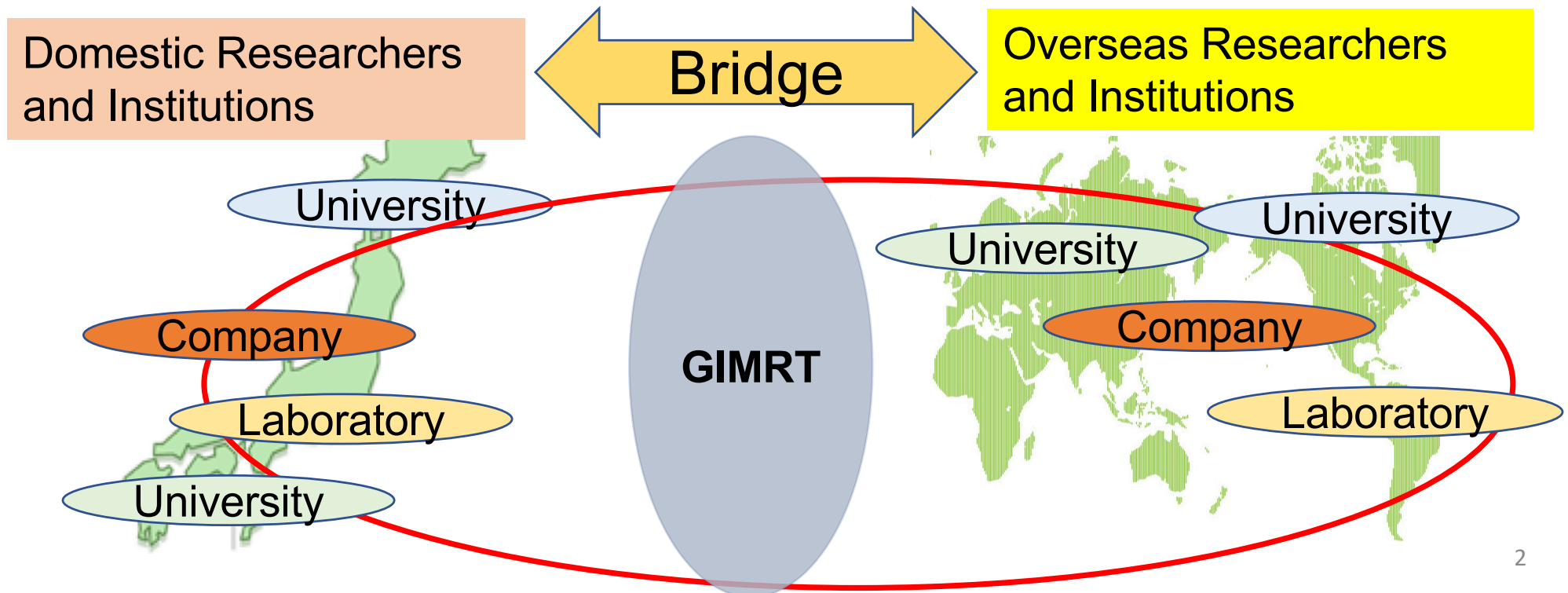
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Global Institute for Materials Research Tohoku

- **GIMRT** is the bridge for multi-core collaboration research to establish international open research alliances in materials science.
- **GIMRT** offers support for overseas researchers to visit Japan for research collaborations involving IMR, domestic, and non-Japanese researchers.
- **GIMRT** offers opportunities for young scientists from Japan to conduct research at overseas institutions.
- **GIMRT** helps to coordinate international workshops, joint-projects, joint-laboratories and knowledge sharing as well as research material transfers.

Materials Research Open Alliance



Outline of Programs

Use IMR Resources for Materials Science

Research Visit for a few weeks

- Single Research Visit

Staying at IMR for few months

- Visiting (Full, Assoc., Assist.) Professor
- Research Fellowship for DC student

Facilities

IMR, Tohoku Univ.

Laboratories

International Research Center for Nuclear Materials Science

High Field Laboratory for Superconducting Materials

Cooperative Research and Development Center for Advanced Materials

Center of Neutron Science for Advanced Materials

Center for Computational Materials Science

Research Division, group and others

Bridge domestic, overseas and IMR researchers

Multi-core research collaboration

- Bridge proposal

Exchange of research community

- International Workshop organization

Research at Overseas Institute

- Travel Support for young scientist

Long term collaboration

- Integrated Joint Project
- Joint Laboratory

Research visit to IMR- a standard basic Single Research Visit

Objective

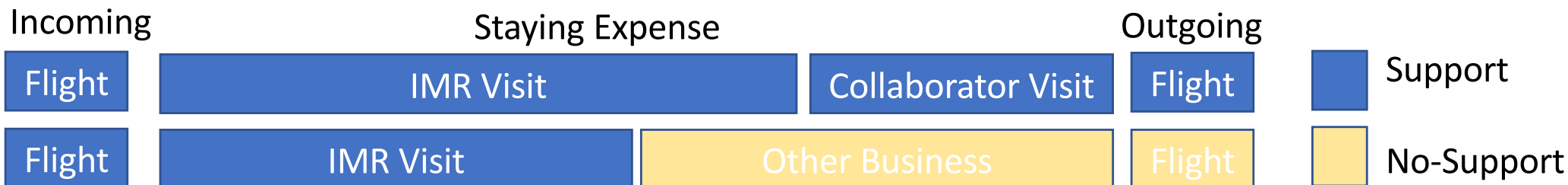
The program supports travel and staying expenses for overseas researchers who are willing to stay for a few weeks at IMR. IMR offers opportunity to conduct research collaboration and to use IMR resources developed for materials science.

How to apply

1. Find an IMR local contact (information of centers/divisions/groups, see P10-15)
2. Select one of centers or divisions/groups as the place to do research
3. Get an user ID at GIMRT user system
4. Submit a proposal at GIMRT user system. The contents of proposals are different for different programs. For the dead line of application, see P8.

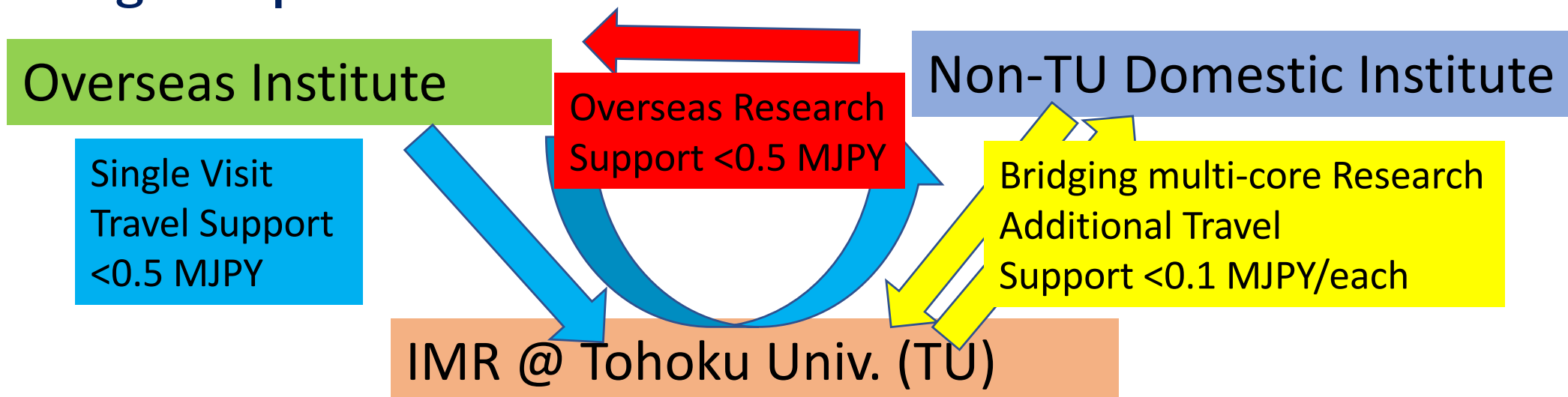
What will be supported(upper limit depends on the review scoring)

1. Travel expenses of the proposer and collaborators to come to IMR
2. Domestic travel expense for visiting non-TU collaborators to perform complementary collaborating research as long as it is short.



*If the period of other business is short, a part of the outgoing flight may be covered.

Bridge Proposal-International Multi-core Research Collaboration



Type of Collaboration	Proposal Forms	Necessary Description
Visit non-TU Collaborator for short discussion etc.	Single Visit Proposal	Write plan, necessity and travel cost. Add non-TU host as collaborator
Invite non-TU Collaborator to IMR	Single Visit Proposal Bridge Domestic	Write plan, necessity and travel cost. Add a non-TU researcher as co-PI
Conduct Research at IMR and non-TU institute and invite non-TU Collaborator to non-TU institute	Single Visit Proposal Bridge Domestic	Write plan, necessity and travel cost. Add a non-TU researcher as co-PI
Conduct Research at non-TU institute by using an instrument partly operated by IMR. Ask to send supporting stuff.	Single Visit Proposal Bridge Domestic	Write plan, necessity and travel cost. Add the supporting stuff as collaborator.
Bridge Research at Overseas Institute	Single Visit Proposal Bridge Oversea	*Combination of Type S and Type O Write plan, necessity and travel cost.
Conduct Special Designated Research at Overseas Institute	Single Visit Proposal Bridge Special	Write plan and necessity Add an overseas host as co-PI
Visit Overseas Institute for Research Collaboration	Type O Proposal	Write plan, necessity and travel cost, also, how applicant develops carrier.

Supports and conditions of Programs

Type	Period	Support	Support for multi-core collaboration
Single Visit	a few weeks	<0.5 MJPY	Can visit non-TU Institute with justification
Bridge Domestic	a few weeks	Add <0.1 MJPY/each	For Japanese participating at IMR
	a few weeks	Add<0.1 MJPY/each	For Japanese participating at non-TU institute
Bridge Overseas	a few weeks	Add<0.5 MJPY/each	Combining single visit and overseas research
Bridge Special	a few weeks	Add<0.5 MJPY/each	For special research program conducted at overseas institute such as material irradiation at foreign reactors.
Oversea Research	Standard >2 weeks	<0.5 MJPY	Support for young scientist of Japan to perform Research at Overseas Institutes
			Qualifications
Visiting Guest Professor	1-6 months	standard salary relocation travel	Full, Assoc. and Assist. Professors and equivalent position at home institute
Research Fellowship	2 months	0.25 MJPY/month	Doctor course student. One can stay longer, but upper limit of support is 0.5 MJPY in total.
International Workshop	-	<1.5 ~2 MJPY	Language English, Travel support of Overseas Participants
Challenging Project	Several weeks to 1 year	<0.5 MJPY	For those who can visit IMR many times or can stay for longer period
Integrated Joint Project	Two year	<10 MJPY	For outstanding research conducting by an international research team

How to select the best international program?

Type S can be combined with Type B or Type O.

For Overseas researchers

Research stay of a few weeks for and researchers(PhD student can be collaborator)

Use one of facilities \Rightarrow Submit proposal for one of centers
Collaborate with IMR groups \Rightarrow Submit proposal for RDG

Travel Support by Type S

In addition, collaborating with researchers other than IMR
Submit Bridge Proposal with domestic co-PI

Travel Support is added for domestic collaborator by Type B

Research stay for a few month

Doctor course student \Rightarrow Fellowship for Young Researcher

Travel and staying Support by Type F

Researchers \Rightarrow Visiting Professor

Employment by Type G

Conduct large scale two years collaboration

Integrated Joint Project Type J

For Both for Overseas and domestic researchers

Conduct small project at IMR \Rightarrow Challenging Project

Research budget support by Type P

Organize workshop \Rightarrow Collaboration with IMR members

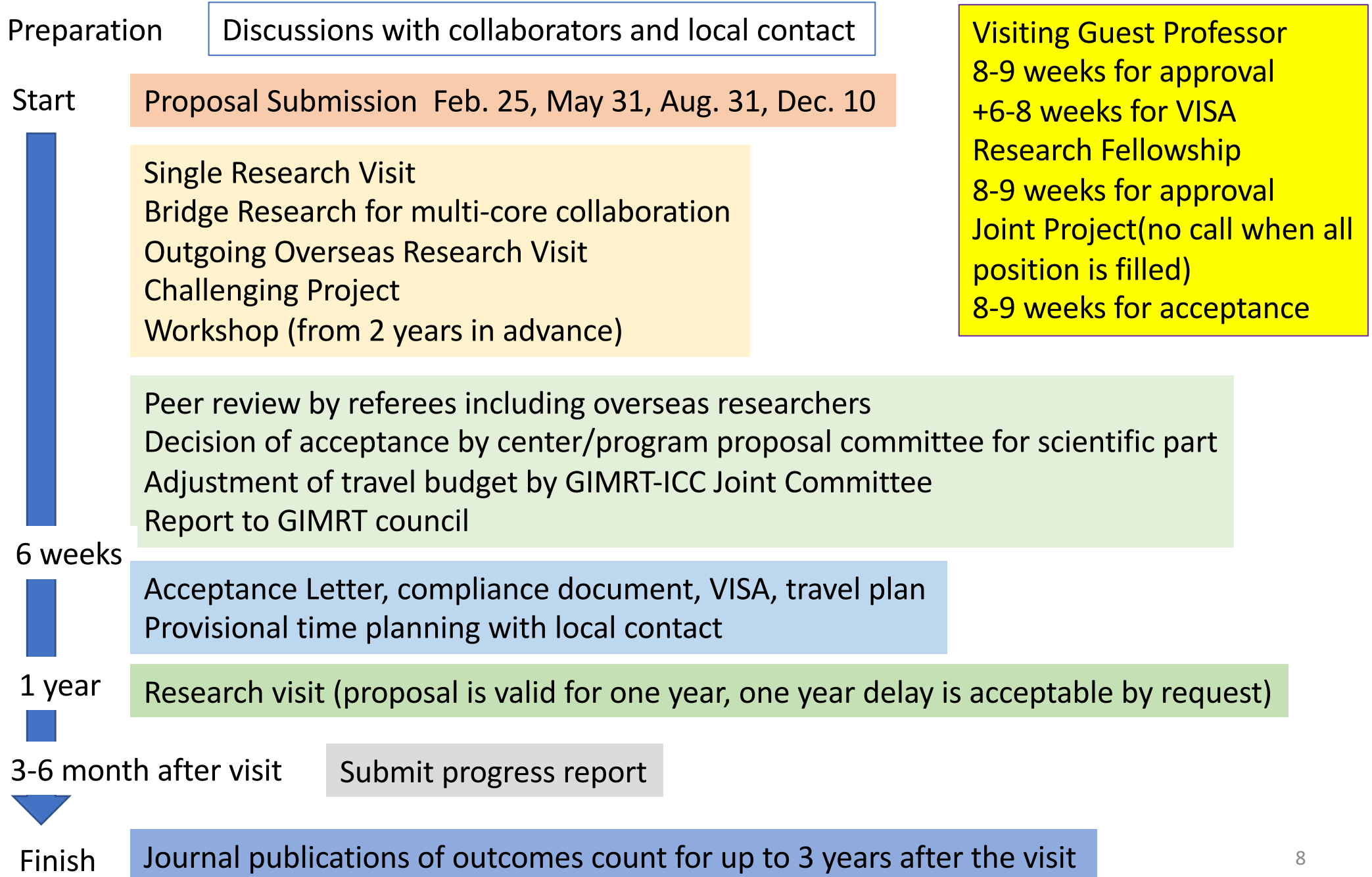
International Workshop type W

For domestic researchers

Conduct research at overseas institutes \Rightarrow Support for visit

Travel support by Type O

Application and Review Process



RDG: Research Divisions and Groups

Outline

IMR has 20 individual Research Divisions and Groups. Collaboration with RDG is conducted jointly by researchers outside IMR and members of each Research Division and Group. This aims to promote research utilizing novel devices, samples, research knowledge, and accumulated information possessed by each Research Division and Group.

Research Divisions and Groups in IMR

Research on each Division and Group is summarized on WEB site below.

<http://www.imr.tohoku.ac.jp/en/about/divisions-and-centers/>

Head of each Division and Group is seen in the next page.

Application

Yearly scientific proposal application for domestic user is Mid. December.

Call for urgent proposal and overseas user application opens 4 times/year.

About 100 proposal is accepted every year. Rejection rate is low, but research expense priority and support depends on the review score.

User Log-in Website

<https://gimrt.appli.imr.tohoku.ac.jp/login>

Group list is in the next page

Head and Catchphrase of each Group

Prof. Nojiri : Magnetism



Exploring Frontier of Magnetism
in High Magnetic Fields

Prof. Akiyama : Environmentally Robust Materials



Elucidation of Effects of Hydrogen on
Material Properties and Design of
Environmentally Robust Materials

**Prof. Furuhashi : Microstructure Design of
Structural Metallic Materials**



Advanced Microstructure Control for
Developing New Structural Metallic
Materials

Prof. Sasaki : Low Temperature Condensed State Physics



Emergent Properties of Correlated
 π -electrons in Flexible Assembly of
Organic Nanostructures

Prof. Miyasaka : Solid-State Metal-Complex Chemistry



Design of Coordination Polymers Toward
the On-Demand Control of Their
Correlated Electrons/Spins and Chemical
Reactions

Prof. Kumagai : Multi-Functional Materials Science



Construction of Computational
Materials Database for Using
First-Principles Calculations

Prof. Tsukazaki : Low Temperature Physics



Exploration for Low Temperature
Physical Phenomena at Solid
Interfaces

Prof. Kubo : Materials Design by Computer Simulation



Solution of Energy and Environmental
Problems and Realization of Safe and
Secure Society by Computer Simulation

Prof. Chiba : Deformation Processing



Development of Highly Functional
Structural Materials by Advanced
Processing

Prof. Fujita : Quantum Beam Materials Physics



Elucidate Origins of Novel Phenomena
Through Probing Structure and Dynamics

Prof. Aoki : Actinide Materials Science



Heavy Fermion Physics of Actinide
and Rare-Earth Compounds

Prof. Kato : Non-Equilibrium Materials



Development of New Functional
Materials by Nonequilibrium Process

Prof. Onose : Quantum Functional Materials Physics



Spins Make Materials Functional

**Prof. Nagai : Irradiation Effects in Nuclear and
Their Related Materials**



Towards Revealing Irradiation-Induced
Defects and Controlling Their Function

Prof. Ichitsubo : Structure-Controlled Functional Materials



Development of Novel Functional/Structural
Materials Through Structural
Control or Phase-Transformation Process

Prof. Fujiwara : Crystal Physics



Crystal Growth for the Future of
the Human Being Society

Prof. Kasada : Nuclear Materials Engineering



Materials Resistant to Extreme
Environments Open the Door to the Next
Generation Base Load Power Plants

Prof. Yoshikawa : Advanced Crystal Engineering



Novel Functional Crystals, Crystal Growth
Technology and Advanced Sensors for
Future

**Prof. Sugiyama : Chemical Physics of
Non-Crystalline Materials**



Inorganic Materials with Complex Structures

Prof. Orimo : Hydrogen Functional Materials



Materials Science of "HYDRIDES" for
Energy Applications

International Research Center for Nuclear Materials Science

Outline

International Research Center for Nuclear Materials Science (IMR-Oarai) is open for the collaborative studies on irradiated-materials and Actinoids elements from all over the world. These research fields cover fundamental studies and R&D on various materials for light water, next-generation and fusion reactors as well as on novel quantum phases in f-electron systems, nuclear fuels and wastes.

Main Facilities

Hot-Cells for neutron irradiated materials
Nanostructural analysis tools (TEM (JEOL ARM200F, JEOL 2100 plus), 3D-AP (CAMECA LEAP-3000XHR), Positron annihilation etc.)
Compact-diverter plasma simulator with Ion-Gun TDS
Tetra-arc furnace with Czochralski puller
Top loading dilution refrigerator with He liquefier for dHvA exp.



Distinct points of IMR-Oarai

Neutron-irradiation using BR2 in SCK/CEN
Integrated experiments from nanostructural analysis (TEM, 3D-AP etc.) to mechanical property tests (Charpy impact, tensile, Vickers hardness, nano-indentation) for irradiated-materials
Single crystal growth of Actinide compounds and physical property measurements

Application

Yearly scientific proposal application for domestic user is Mid. December.
Call for urgent proposal and overseas user application opens 4 times/year.
About 80-90 proposal is accepted every year.

Website

<http://www.imr-oarai.jp/eng/>

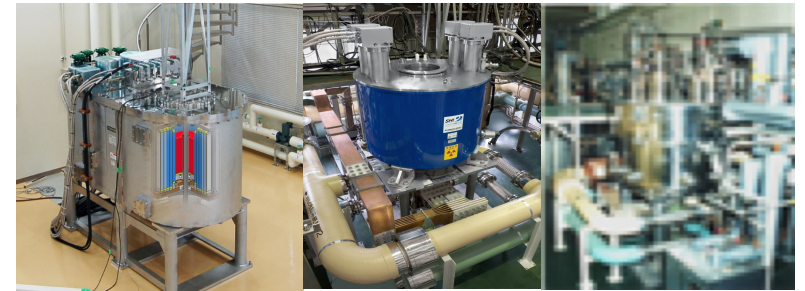
HFLSM: High Field Laboratory for Superconducting Materials

Outline

HFLSM is the world leading laboratory for High- T_c based cryogen free high field magnet technology. It was founded in 1981 for Superconducting Material for Fusion Research and reformed to be a laboratory for materials science in high magnetic field. The central subject are studies of superconducting and magnetic materials, magnet technology and material process in high magnetic fields.

Main Facilities

25T Cryogen free superconducting magnet
28T Cryogen free hybrid magnet
31 T Hybrid magnet



Distinct points of HFLSM

Cryogen free magnets offers non-stopping high quality magnetic fields for users.
Established instrumentation in various physical measurements.
Supporting collaboration with skilled material scientists of IMR.

Application

Yearly scientific proposal application for domestic user is Mid. December.
Call for urgent proposal and overseas user application opens 4 times/year.
Magnet time request is possible in every two months for approved proposal.
About 105 proposal is accepted every year. Rejection rate is low, but magnet time priority and support depends on the review score.

Website

<http://www.hflsm.imr.tohoku.ac.jp/cgi-bin/index-e.cgi>

CRDAM: Cooperative Research and Development Center for Advanced Materials

Outline

CRDAM, originally founded as Laboratory for Developmental Research of Advanced Materials in 1987, is carrying world-leading materials research and providing supports in wide range of production and characterization of materials to research communities not only in Japan but worldwide.

Types of Collaborative Research

- a) Collaboration with researchers in CRDAM (including visiting professorships)
- b) Usage of the equipment installed at CRDAM

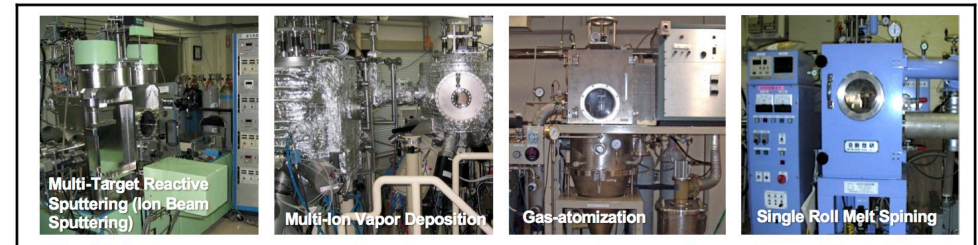
Application

- ✓ Yearly scientific proposal application for domestic user is due in Mid. December.
- ✓ An urgent proposal can be accepted by request.
- ✓ Call for overseas user application opens 4 times/year.
- ✓ About 100 proposals are accepted every year. Rejection rate is low.
- ✓ A few excellent researches are commended every year.

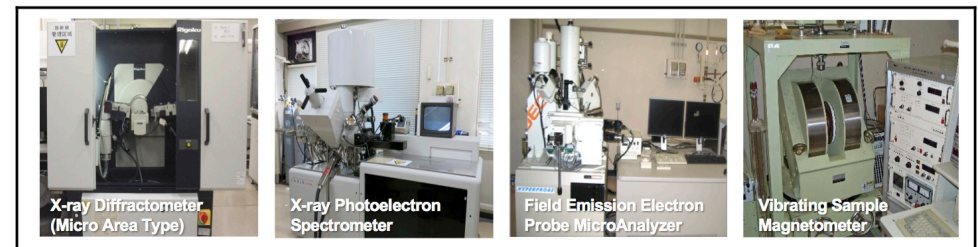
Website <http://www.crdam.imr.tohoku.ac.jp/en/index-en.html>

Main equipment in the supporting station

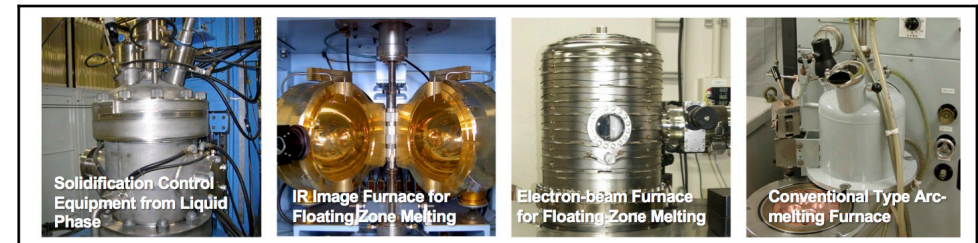
Materials Synthesis Station - To produce various kinds of materials



Performance Evaluation Station - To evaluate various states/properties of materials



Crystal Making Research Station - To prepare mother alloys or single crystals



CCMS: Center for Computational Materials Science

Outline

CCMS is the world leading computational materials research center and it was founded in 1994 for materials design using supercomputer. Our center provides a computational resources to materials research community and promotes the development of the software for supercomputer as well as its application to materials science.

Main Facilities

1. Supercomputer (Large-Scale Parallel Computing Server)
Model: Cray XC50-LC
320 nodes, 0.91 PFLOPS, 219.8 TiB memory
2. Supercomputer (Accelerator Server)
Model: Cray CS-Storm 500GT
29 nodes, 2.12 PFLOPS, 21.8 TiB memory
3. Parallel Computing & Informatics Server
Model: HPE ProLiant DL 360
29 nodes, 0.1 PFLOPS, 16.3 TiB memory

Configuration of the supercomputing system



Application

- ✓ Yearly scientific proposal application for domestic user is Mid. December.
- ✓ An urgent proposal can be accepted each time by request.
- ✓ About 30 proposals are accepted every year. Rejection rate is low, but the allocation of time-node amount depends on the review score.

Website

<https://www.sc.imr.tohoku.ac.jp/eng/index.html>

CNSAM: Center of Neutron Science for Advanced Materials

Outline

CNSAM operates three neutron spectrometers in a research reactor facility JRR-3 under a general user program, and a state-of-the-art polarized neutron spectrometer at J-PARC/MLF. By utilizing the unique platform of the neutron instruments, our center aims at contributing to the development of materials science and neutron science.

Main Facilities

Polarization Analysis Neutron Spectrometer (POLANO, TOPAN)
High Efficiency and High Resolution Measurements (HERMES)
Advanced Triple-Axis Neutron Spectrometer (AKANE)

Distinct points of CNSAM

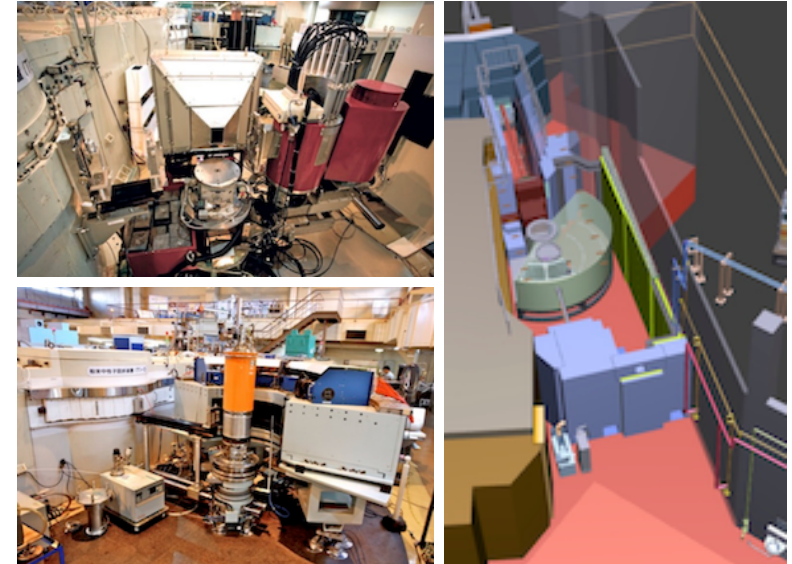
Structural analysis of functional materials including light elements.
Integrated experiments of dynamical properties such as magnon, phonon and composite excitations in various systems.
Multi-scale structure and dynamics in inhomogeneous systems

Application

Yearly scientific proposal application for domestic user is Mid. December.
Call for urgent proposal and overseas user application opens 4 times/year.
We will newly start above user programs from FY 2019.
The number of users for instruments at JRR-3 every year was total 200 individuals from 70 groups.
(Statics before the earthquake 2011)

Website

<http://www.imr.tohoku.ac.jp/en/about/divisions-and-centers/research-centers/02.html>



ICC-IMR: International Collaboration Center

Outline

<http://www.icc-imr.imr.tohoku.ac.jp/>

The International Collaboration Center, abbreviated as ICC-IMR, was founded in April, 2008. The ICC-IMR promotes international collaboration in materials science. Its activities are coordinated with the National Joint Usage / Research Center System conducted by the research divisions and centers of the IMR. The ICC-IMR aims at creating a worldwide community of materials science researchers and contributing to educating young researchers in becoming world-leaders in their fields. The ICC-IMR is a gateway to facilitate diverse collaborations between international researchers and the scientific staff of the IMR.

The ICC-IMR coordinates six different programs:

ICC-IMR Programs

- 1. *Visiting Guest Professorships***
- 2. *International Workshops for exchange between IMR and other institutes***
- 3. *Integrated Project Research***
- 4. *Fellowship for Young Researchers and PhD Students***
- 5. *Material Transfer Program***

Note Short Single Research Visits is merged to the program of centers and laboratories

Application

Applicant groups should be organized by both faculty members of this institute and researchers from foreign research or educational organizations (industrial and commercial organization are not eligible). General technical staff or graduate students can be involved as investigators in each group. Staff inside Japan should follow the bases of the inter-university collaboration research program.

Application Period: 4 times a year

【Visiting Guest Professors】

Individuals staying for longer than a month can apply for a visiting professorship. Successful applicants are employed as formal visiting professors of IMR. Supporting period depends on score and application numbers. Qualifications: University professors, associate professors, lecturers or equivalent, foreign researchers. In addition to continuous stay type, there is a part-time staying type. In the latter, one can split the stay in several ones.

【International Workshops】

International workshops based on this institute can be held to promote international research on material science. Faculty members of this institute should represent applications and board members of the workshop should contain foreign researchers. Total amount of 1.5~2 million JPY can be spent on travel expenses of invited guests. It is preferred that each workshop be held in collaboration by other sponsors.

【Fellowships for Young Researchers】

Fellowship program sponsors foreign young researchers and PhD students in order to promote international collaborative research with and at the IMR by up to 250,000 JPY a month for a maximum of two months. This program does not apply to short stays for attending International Conferences. The application should be submitted by the young researcher's supervising faculty member, who also acts as referee. The young researcher should be dispatched at the referee's request.

【Integrated Project Research】

Teams containing Japanese and foreign researchers, conducting joint research on development of material science are eligible for application. Applications should be represented by foreigner researchers. Accepted application will be granted total budget of 3 ~10 million JPY, this budget can be used for inviting foreign researchers, providing research equipment, consumption or travel expenses of researchers of this institute involved in the joint research and can be extended for 2 years. Project should be focused on international collaboration. 1~2 projects will be granted each year.