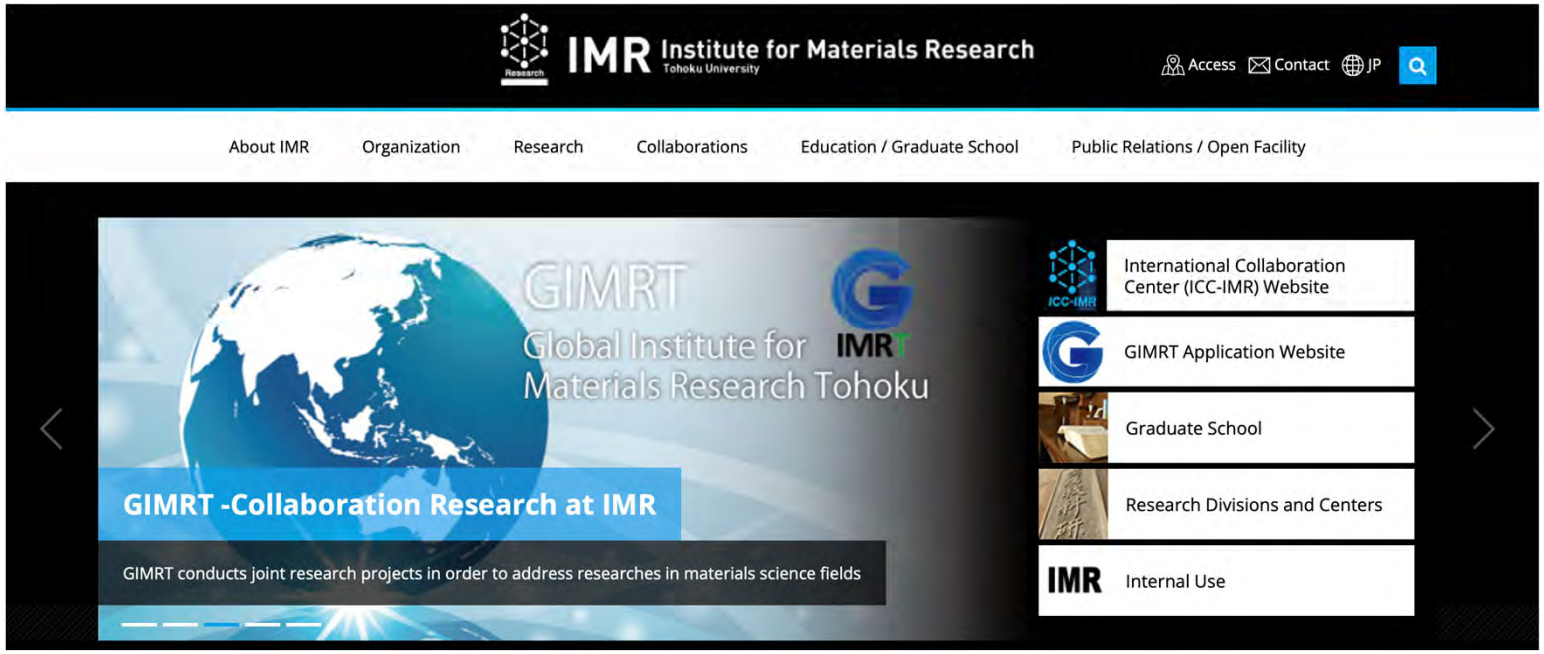
No.1 Outline of Global Institute for Materials Research Tohoku (GIMRT)

GIMRT is the International User Program of Institute for Materials Research (IMR), Tohoku University

IMR is the International Center of Excellence for Materials Science founded in 1916



Our Mission

- Conducting a broad range of basic and applied materials research
- Creating new materials that benefit society
- Contributing to civilization and the well-being of mankind

GIMRT Program - Area and Type

Area - Category of Facility, Center, and Research Group

- Research Divisions and Groups
- International Research Center for Nuclear Materials Science
- Cooperative Research and Development Center for Advanced Materials
- High Field Laboratory for Superconducting Materials
- Center for Computational Materials Science
- Quantum Beam Center for Materials Research
- Innovative Knowledge Hub for Humanities and Materials Science

Type - Proposal Scheme

- **Single Visit** - Research Visit to IMR
- **Bridge Research** - Research Visit/Collaboration including **3rd Party**
- **Oversea Research** - Support for **Young Researcher of Japan** to perform for weeks of collaboration research in **Oversea Institutions**
- **Workshop** - Support for organize workshop at IMR

GIMRT Opens Large Facilities for Collaborations

World Leading Facilities

International Research Center for Nuclear Materials Science

- Unique post irradiation materials research infrastructure
- World leading laboratory for physics and materials science on actinide

IRCNMS

High Field Laboratory for Superconducting Materials

- The world highest superconducting user magnet by unique cryo-free technology
- Development of superconducting and magnetic materials

HFLSM

Materials Science Oriented Supercomputer

Center for Computational Materials Science

CCMS

- Supercomputer oriented for computational materials science
- Member of K computer user network and High-Performance Computing Infrastructure

Collaboration with Large Scale Facilities

Quantum Beam Center for Materials Research

- Contributing to the formation of complementary quantum beam platform
- Integrating material science and quantum beam usage

QBCMR

Sharing the Knowledge for Materials Development

Cooperative Research and Development Center for Advanced Materials

- Comprehensive support for materials development and investigation
- Sharing of knowledge to develop new materials

CRDAM

Research Division and Groups

Collaboration of expert of Materials Research

RDG

Prof. Fujiwara : Crystal Physics

Crystal Growth for the Future of the Human Being Society

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

Towards Revealing Irradiation-Induced Defects and Controlling Their Function

Prof. Seki : Magnetic Materials

Materials Fabrication for Magnetics / Spintronics by Nanostructure Control

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. Orimo : Hydrogen Functional Materials

Materials Science of "HYDRIDES" for Energy Applications

Prof. Nomura : Theory of Solid State Physics

Theoretical Investigation of Quantum Many-Body Physics

Prof. Kasada : Nuclear Materials Engineering

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

Prof. Kumagai : Multi-Functional Materials Science

Construction of Computational Materials Database for Using First-Principles Calculations

Prof. Sasaki : Low Temperature Condensed State Physics

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

Prof. Yoshikawa : Advanced Crystal Engineering

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

Assoc. Prof. Yamanaka : 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. Sugiyama : Chemical Physics of Non-Crystalline Materials

Inorganic Materials with Complex Structures

Prof. Aoki : Actinide Materials Science

Heavy Fermion Physics of Actinide and Rare-Earth Compounds

Prof. Onose : Quantum Functional Materials Physics

Spins Make Materials Functional

Prof. Ichitsubo : Structure-Controlled Functional Materials

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

Prof. Watanabe : Analytical Science

Development and Applications of Nano Fine-structure Characterization and Chemical Analysis for Understanding Various Materials Properties

Prof. Furuhara : Microstructure Design of Structural Metallic Materials

Advanced Microstructure Control for Developing New Structural Metallic Materials

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. Umetsu : Cooperative Research and Development Center for Advanced Materials

Advanced Materials Make Dreams Come True — A Bridge to the Future

Prof. Kubo : Materials Design by Computer Simulation

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

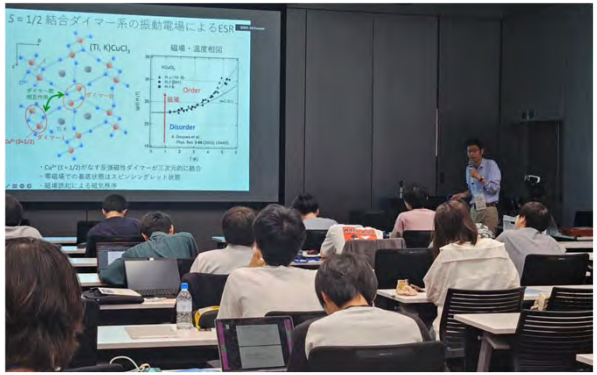
Prof. Kato : Non-Equilibrium Materials

Development of New Functional Materials by Nonequilibrium Process

Prof. Awaji : High Field Laboratory for Superconducting Materials

Exploring Novel States of Materials in High Magnetic Fields

Workshop, Summer School



Collaboration Including Humanity Science

Innovative Knowledge Hub for Humanities and Materials Science

IKH was established in 2023 to create a new academic field by the close collaboration between humanities and materials sciences. To achieve this goal, IMR aims to build the hub for new collaborative research with seven academic institutions covering varieties of science.
To open the new academic discipline, new proposal scheme including long-term proposal category, will be implemented to GIMRT.

GIMRT Programs for International Collaboration

Single Visit Type S

Standard research visit to IMR (1~2weeks)

- Multiple visitors/Multi persons visit available
  (Ph. D student can be collaborator)

Bridge Type B

Multi-core Research Collaboration

- **for Overseas researchers**
  - Visit IMR together with non-TU collaborators
- **for non-TU domestic researcher**
  - Invite a researcher from overseas institute to own institute
  - Work together at IMR and at J-PARC, Nano-Terasu etc.

NEW from 2022

Covis
Co-research visit

Team visit (combination of Long & Short stay)
for strong and sustainable co-research team

- Example
  Residential type visit (Type G= Guest Professor)
  ＋
  Short-term intensive visit (Type S)

Overseas Research Type O

Experiment
Networking
Discussion

In 2023, total 5 researchers visited EU and NA

For young scientist (under 40) in Japan
(2 weeks ~ 3 months)

- Travel support (up to JPY 0.5M) to visit oversea institutes for research collaboration

Example of Type S-Single Visit Program

High Magnetic Field Laboratory for Superconducting Materials

Support for user

- Access for HIGH Field Magnets
- Technical Support for Experiments
- Support for Travel Expense
- Support for VISA and other Documents

Duty for user

- Write a Completion Report
- Publish Results
- Buy Proper Insurance (travel, medical, and accident)
- Safety Training
- Provide Documents Necessary for Visit and Reimbursement

For oversea proposal, the maximum travel support is 0.5 MJPY/proposal
There is some reduction based on the review scoring

Application Process and Information

How to apply

1 **Read Proposal Call and Guideline**

Proposal Call and Guideline are here

2 **Find Facilities or Research Groups** to use/collaborate and check what you can do there

3 **Find an IMR Local Contact and discuss** if your proposal can be performed

4 Get a **User ID** at GIMRT User System and prepare **Proposal**

Proposal forms are here

5 **Submit a proposal** at GIMRT User System

GIMRT application site

Information of IMR Researchers

Information of GIMRT Program

Recent Activity of GIMRT at SNS

- X (Twitter)
- Instagram
- Threads

Application and Review Process

Preparation — Discussions with collaborators and local contact

Start — Proposal Submission: March. 13, May 30, Aug. 29, Dec. 12

All Area and Types of Proposal. Workshop may be applied 2 years in advance

Proposer (PI) must be a researcher such as faculty or postdoc
PhD student cannot be PI, but can be collaborator

Peer Review by Referees including Overseas Researchers
Decision of Acceptance by center/program Proposal Committee

6 weeks

Acceptance Letter, Compliance document, VISA, travel plan
Provisional time planning with local contact

Research visit (proposal is valid for one year, one year delay is acceptable by request)

1 year

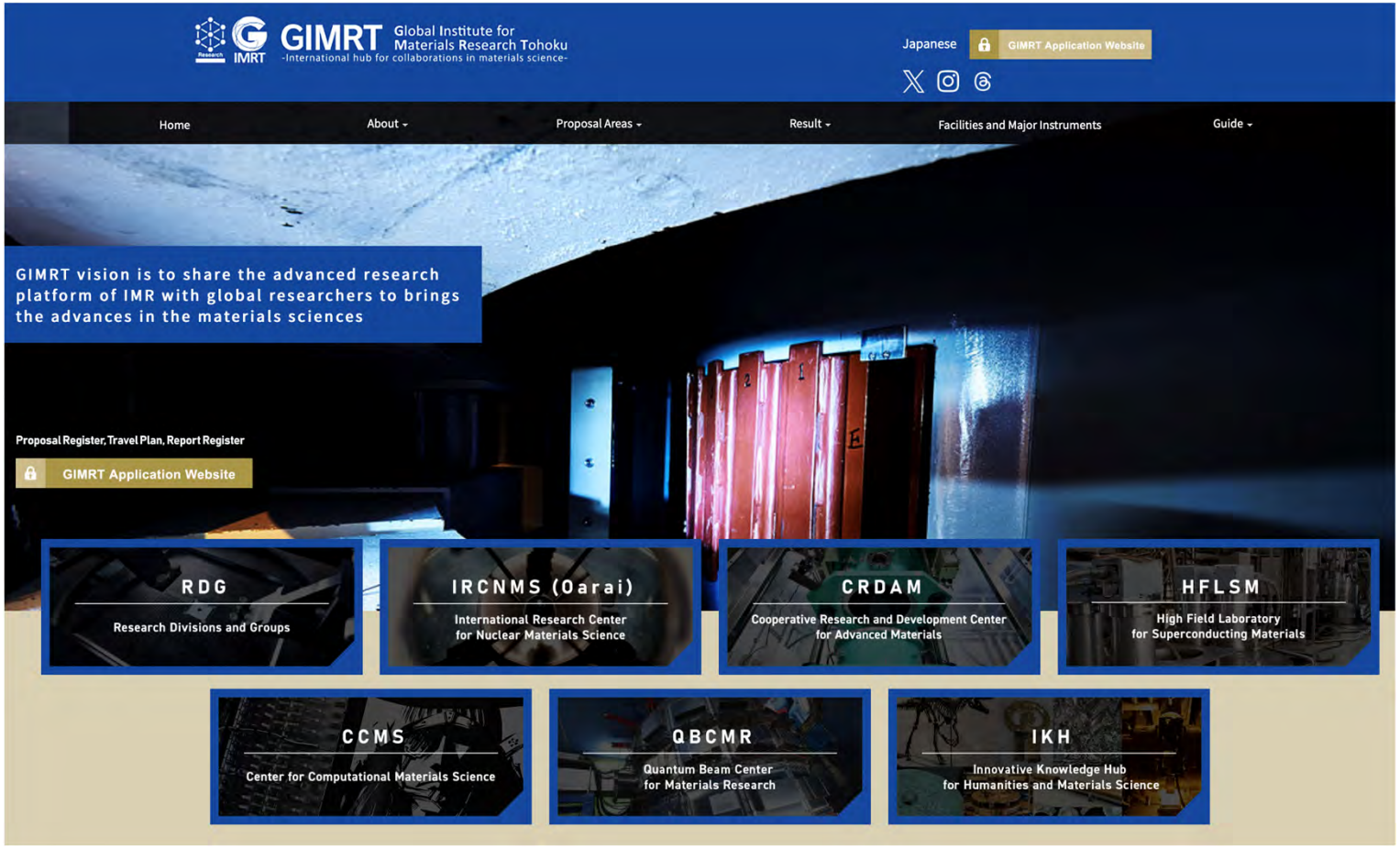
3 months after complete — Submit Completion report

Finish — Journal publications of outcomes count for up to 3 years after the visit

Welcome your application

Join GIMRT ！ Click Here

More Information Movies will be posted in Our Site

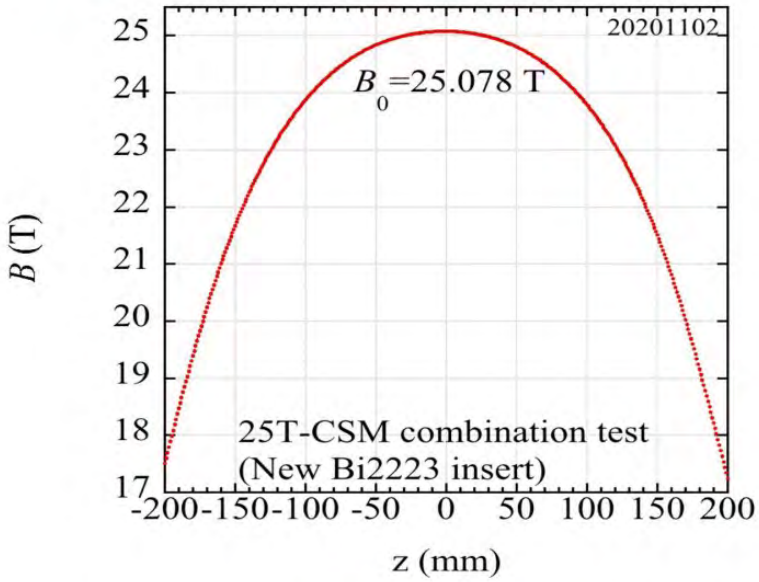


拠点の中間評価結果

通し番号	13
国際共同利用・ 共同研究拠点名	材料科学国際共同利用・共同研究拠点
大学等名 （研究施設名）	東北大学（金属材料研究所）
評価区分 （中間評価結果）	S
評価コメント	材料科学研究分野の中核的研究拠点として、無冷媒強磁場マグネットや中性子散乱実験施設、スーパーコンピュータといった世界最高水準の大型施設と、蓄積した実績と研究者陣容をもつ研究環境を国際的な共同利用・共同研究に供するとともに、高温超伝導材料などの材料科学に関わる多様な研究テーマで分野融合的な共同研究も大規模かつ組織的に展開している。国際共著論文割合比率や TOP10%論文数も増加しており、世界水準の優れた成果を数多く創出することにより、国内外の関連コミュニティへの多大なる貢献を果たしていることは極めて高く評価できる。 今後は、引き続き、外国人研究者や女性研究者の教員への積極的な登用を行う等のダイバーシティの向上に向けた取組をさらに推進していくことが期待される。

Operation of 25T-CSM

【File No.9】



Advantages of CSMs

- LHe-free
- Long holding time of high magnetic field up to 1 year in principle
- 1 hour ramping time
- High precision experiments

33T cryogen-free superconducting magnet (33T-CSM)

【File No.9】

Under construction

Magnets (HTS-REBCO): 19 T

- Robust REBCO pancakes
- Inner dia. ≈ ϕ68mm (RT bore 32mm)
- Max. hoop stress **< 400 - 500 MPa**

Magnets (LTS): 14 T

- CuNb/Nb_3Sn & NbTi Rutherford solenoids (R&W)
- Inner dia. ≈ ϕ320 mm
- Max. hoop stress **≈ 275 MPa**

Cooling system

- Conduction cooling with He circulation
- Shield: 1-stg GM cryocooler x 2
- HTS: 4K-GM cryocooler x 4 (1.5 x 4 =6W@4.2K)
- LTS: GM/JT cryocooler x 1 (9W@4.2K)

Installed on March 2024