

Joint Research Contract

This Joint Research Contract ("Contract") is made and entered into by and between the National Institute of Advanced Industrial Science and Technology ("AIST") and Chiang Mai University ("CMU") (collectively, the "Parties" and individually, the "Party").

This Contract is comprised of two inseparable parts, namely: "Special Conditions," which describe specific matters herein and "General Terms and Conditions" set out below, which apply to all matters not described in the Special Conditions, with their attachments hereto. The Special Conditions should be read in conjunction with the General Terms and Conditions. In the event of any conflict or inconsistency between the Special Conditions and the General Terms and Conditions, then the Special Conditions will apply but only to the extent of such conflict or inconsistency, unless otherwise stated in the General Terms and Conditions.

WHEREAS, AIST and CMU desire to conduct the joint research specified in the Special Conditions ("Joint Research");

WHEREAS, the Parties desire to execute a definitive agreement with respect to such Joint Research;

NOW, THEREFORE, in consideration of the foregoing and the premises and conditions set forth herein, the Parties hereby agree as follows:

Special Conditions

Article I: Identification

The Parties shall jointly conduct the Joint Research with the objective as follows:

- (1) Joint Research Title: Development of thermoelectric materials and devices for waste heat energy harvesting in ceramic, agriculture and energy industries
- (2) Joint Research Purpose: Development of thermoelectric materials and devices with strong durability against high temperature and oxidation for waste heat energy harvesting in ceramic, agriculture and energy industries.
- (3) Technical Description of Work: Development of thermoelectric materials and devices with strong durability against high temperature and oxidation to hold demonstration test in preparation for the social implementation.
- (4) Respective Roles and Responsibilities: Each of the Parties will satisfy the objectives of the research as described in Attachment 1.

Article II: Term

This Contract shall commence on the date of signing and end on March 31, 2026. Upon the expiration of that term, this Contract may be renewed if necessary and mutually agreed to in writing by the Parties.

Article III: Expenses

Each of the Parties, in principle, shall bear its own Research Expenses required in the course of this Joint Research; provided, however, CMU agrees to provide to AIST with the following amount in two installments of Research Fund which shall be used to cover Research Expenses:

Total payment: JPY 3,000,000

First payment: JPY 1,500,000 (50% of total amount) (paid within 30 days after invoice issue date)

Second payment: JPY 1,500,000 (50% of total amount) (paid within 30 days after invoice issue date)

Article IV: Personnel

The Parties shall engage the personnel listed in Attachment 2 in the Joint Research as research participants.

IN WITNESS WHEREOF, the Parties have prepared this Contract in duplicate and affixed their respective signatures thereon by duly authorized representatives, with each of the Parties retaining one original copy. In the event that any signature is delivered by e-mail delivery of a "pdf" format data file, such signature shall create a valid and binding obligation of the party executing with the same force and effect as if "pdf" signature page were an original thereof.

Date: May 19, 2025

AIST: National Institute of Advanced Industrial Science and Technology
1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo, 100-8921 Japan

Yanagibori Akira

YANAGIBORI Akira, Director,
Research Collaboration Contract Division,
Facilities, Safety and General Services Headquarters

Date: - 7 MAY 2025

CMU: Chiang Mai University
239 Huay Kaew Rd, Muang Chiang Mai, 50200 Thailand

x Winita Punyodom

PUNYODOM Winita, Associate Professor
Vice President for Research Administration and Academic Services,
Chiang Mai University



General Terms and Conditions

Article 1: Definitions

1. "Research Participant" as used in this Contract means the following:
 - (1) Executive, employee, contract employee, visiting researcher, temporary loaned staff, and any other person of the Party ("Officer and Employee"), who engages in the duties of each of the Parties in relation to the performance of the Joint Research ("Participating Researcher")
 - (2) Officer and Employee other than the Participating Researchers who participate in the Joint Research for purpose of support for the performance of the Joint Research ("Research Assistant")
2. "Intellectual Property Right" as used in this Contract means any and all world-wide intellectual property rights, including, but not limited to the following:
 - (1) Patent rights, utility model rights, design rights, trademark rights, layout-design exploitation rights, breeder's right and the right to obtain these rights;
 - (2) Copyright for computer programs and databases ("Programs"); or
 - (3) Rights to manage and use other technical information (including but not limited to experimentation data, sample materials, and drawings) as confidential which is of concealable and proprietary nature and is designated through consultation between the Parties ("Know-how").
3. "Invention" as used in this Contract means all of the following: invention subject to a patent right; idea subject to a utility model right; creation subject to rights to registered design, registered trademark, circuit layout usage and written product of Programs; breed subject to a breeder's right; and devising subject to Know-how.
4. "Application" as used in this Contract means an application for a patent right, a utility model right, a trademark right or a design right, a request for registration of a circuit layout usage right, an application for various registration of a breeder's right, registration of a copyright of Programs, at any countries.
5. "Exploit" as used in this Contract means the act of using the rights of Inventions protected by each country's regulations and the act of using Programs and Know-how.

6. "Results" as used in this Contract means Intellectual Property Right relating to Invention which is created independently by Participating Researcher of a particular Party or which is created jointly by Participating Researchers of both Parties (hereinafter referred to as "Relevant Intellectual Property Rights"), tangibles (hereinafter referred to as "Relevant Result Tangibles") and all the other technological achievements, in the course of or as the results of the Joint Research.
7. "Confidential Information" as used in this Contract means any technical or business information (except the Results): (a) which is provided or disclosed in written or tangible form with an appropriate confidential mark by the disclosing Party, or (b) when disclosed orally or otherwise than in tangible form, which is designated as confidential at the time of disclosure and thereafter within thirty (30) days, a written summary of such disclosure, specifically identifying the items of confidential, is provided to the receiving Party, excluding the information that falls under any of the following:
 - (1) information which was in the public domain at the time of disclosure or thereafter enters the public domain through no fault of the receiving Party;
 - (2) information that is lawfully obtained from a third party without confidential obligations;
 - (3) information which is already in the possession of the receiving Party at the time of its receipt from the disclosing Party; or
 - (4) information that can be proven in writing to have been developed independently by the receiving Party without using information received from the disclosing Party.

Article 2: Performance of the Joint Research

1. The Parties shall perform this Joint Research with the intention to serve and promote the public interest.
2. The Parties shall cooperate with each other in performing the Joint Research through their Research Participants enumerated in Attachment 2. The Parties shall require their Research Participants to observe provisions of this Contract, therefore to

administer and efficiently carry out the Joint Research.

3. Each of the Parties shall be individually responsible for performing the work enumerated in Attachment 1 and shall not commission all or portions of such work to any third party, unless a prior written consent is given by the other Party.

Article 3: Addition and Alteration of Research Participant

Each of the Parties may add or alter their Research Participant by a prior written notice to the other Party after having a discussion and obtaining the other Party's consent. In case it is impossible to give a prior notice due to a reason of its addition or alteration, the concerned Party shall notify immediately the other Party of that after the fact.

Article 4: Dispatch of Research Participant

1. Each of the Parties may dispatch its own Research Participant to the facilities of the other Party as provided for in Attachment 2 and make them engage in the performance of the Joint Research. In such case, each of the Parties shall take necessary measures for the dispatched Research Participant to observe the instructions, internal rules and regulations of the other Party.
2. When each of the Parties wishes to change a plan about whether or not to dispatch its Research Participant to the other Party, each of the Parties shall provide a prior written notice to the other Party after having a discussion and obtaining an agreement between Research Participants of both Parties. In case it is impossible to give a prior notice due to a reason of its addition or alteration, the concerned Party shall notify immediately the other Party of that after the fact.
3. Should the Research Participant of one Party be confronted with an accident or disaster within the premises of the other Party, that Party shall cooperate with the other Party in handling the situation and investigating the causes.

Article 5: Payment of Research Fund and Expenditure Report

1. The Research Fund as stipulated in the provision of Article III of Special Conditions of this Contract shall be paid by CMU to AIST on or before the due date stated in a bill issued by AIST.
2. The actual contract date is the date of the signature completion from both parties after which the invoice will be issued by AIST. The payment must be paid within 30 days of the invoice issue date.
3. If CMU fails to pay the amount stipulated in the previous paragraph by the due date, an interest charge of 3.0% per annum will be applied to the amount from the day following the due date until the date the payment is received in full.
4. All equipment, furniture, parts, or materials purchased with the Research Fund shall belong to CMU.
5. AIST shall be responsible for management of the Research Fund under the rules of AIST. In case the Contract is terminated pursuant to Article 21 or Article 22 (except in the case the Contract is terminated pursuant to Article 22, paragraph 1), AIST shall reimburse CMU the remaining amount of the Research Fund already paid by CMU, if CMU requests for a refund.
6. AIST shall submit to CMU an expenditure report on the Research Fund when CMU requests.

Article 6: Use and Delivery of Equipment

1. Each of the Parties may, with a consent of the other Party, use at no charge the equipment and fixtures ("Equipment") that are under the management of the other Party and that are necessary for the performance of the Joint Research, provided, however, that the Parties will decide after consultation on sharing the cost necessary for operating and maintaining the Equipment if necessary.
2. Each of the Parties may, with a consent of the other Party, deliver to the other Party's

premises and use necessary Equipment for the performance of the Joint Research.

3. Each of the Parties shall observe instructions, rules, and regulations of the other Party in the case of foregoing two paragraphs.

Article 7: Confidentiality

1. The Parties shall treat Confidential Information as confidential, and each of the Parties shall not commit any of the acts listed in the following items:
 - (1) To provide or to disclose Confidential Information to a third party without the other Party's prior written consent;
 - (2) To leak Confidential Information;
 - (3) To disclose Confidential Information to anyone of the Party other than Officer and Employee who need to know such Confidential Information; and
 - (4) To use Confidential Information for the other purpose than the research purpose covered by this Contract.
2. Notwithstanding the foregoing paragraph, when disclosure of Confidential Information is required by a result of governmental or judicial order, the concerned Party shall notify immediately the other Party of the effect. In such a case, the Party which is required to disclose Confidential Information may disclose necessary minimum information to the governmental organization or the court without the other Party's prior consent.
3. Notwithstanding the provision of paragraph 1, the Parties may disclose necessary information to the external experts such as patent attorneys or lawyers who have a professional obligation of confidentiality; provided, however, that the Party disclosing Confidential Information shall be liable for any breach of confidentiality caused by the external experts.

Article 8: Publication of Results

1. When either Party announces publicly the Results, that Party shall disclose to the other Party the contents of the publication in advance.

2. The publishing Party shall obtain a written prior consent of the other Party, when the contents of the publication include information which falls under any of the following:
 - (1) Confidential Information of the other Party;
 - (2) Results which are solely created by the other Party (except Results like falling under the exceptive cases as itemized in Article 1, paragraph 7); or
 - (3) Relevant Intellectual Property Rights or Relevant Result Tangibles which are jointly-owned by both Parties (except Relevant Intellectual Property Rights or Relevant Result Tangibles like falling under the exceptive cases as itemized in Article 1, paragraph 7).
3. If either Party seeks consent to the publication pursuant to the foregoing paragraph where the publication includes information of Relevant Intellectual Property Rights or Relevant Result Tangibles set forth in foregoing paragraph, item 3, the other Party shall not withhold its consent without good cause.
4. Foregoing article (excluding paragraph 1, item 4) shall apply mutatis mutandis to information set forth in paragraph 2, item 2.

Article 9: Research Summary

Within thirty (30) days of the completion of the Joint Research, the Parties shall require their own Research Participants to make a summary report on the overall Joint Research achievement and mutually provide it to each other.

Article 10: Ownership of the Rights to Results

1. The Relevant Intellectual Property Rights and Relevant Result Tangibles as Results shall be solely-owned by a Party or jointly-owned by Parties pursuant to the provisions of the following paragraph.
 - (1) The Relevant Intellectual Property Rights related to Inventions made independently by a Participating Researcher of either Party shall be owned solely

by such Party.

- (2) The Relevant Intellectual Property Rights related to any Inventions made jointly by Participating Researchers of both Parties ("Jointly-Owned Relevant Intellectual Property Rights") shall be owned jointly by the Parties with the extent of the ownership to be determined through consultation between the Parties, taking into consideration the contributions made by the respective Parties. Such contribution shall reflect the work done by the Participating Researchers of the Parties for the creation of such Invention and shall not reflect monetary contributions.
 - (3) Relevant Result Tangibles made independently by a Participating Researcher of either Party shall be owned solely by such Party; and Relevant Result Tangibles made jointly by both Parties shall be owned jointly by the Parties.
2. When a question about the ownership of Relevant Intellectual Property Rights or Relevant Result Tangibles occurs or when there is a contract or other special fate with a third party, the handling shall be determined through consultation between Parties.
 3. If an Invention is made independently by a Participating Researcher of either Party in the course of the Joint Research, the concerned Party shall notify the other Party of the effect without delay.

Article 11: Applications for Relevant Intellectual Property Rights

1. If each of Parties seeks to apply for solely-owned Relevant Intellectual Property Rights, that Party shall obtain the other Party's prior approval for its application.
2. If the Parties seek to apply for Jointly-Owned Relevant Intellectual Property Rights, the Parties shall consult with each other to decide the scope of the Application and the country in which the Application should be filed, and that Application shall be filed jointly in principle.
3. In case of Application filed jointly pursuant to the provision of foregoing paragraph, the Parties shall enter into a separate contract for each Intellectual Property Rights generated from the Joint Research on sharing of the Relevant Intellectual Property Rights, which shall define the manner of sharing such rights and maintenance costs

(means fees necessary to acquire and maintain the Relevant Intellectual Property Rights such as patent office fees and fees to outside patent attorneys not belonging to either Party, 'Maintenance Expenses') and other necessary matters regarding the Relevant Intellectual Property Rights.

Article 12: Designation of Know-how

1. With regard to a certain part of the Jointly-Owned Results considered to be protected as Know-how, the Parties shall consult with each other and promptly designate the relevant part as Know-how as specified in Article 1, paragraph 2, sub-paragraph (3).
2. In designation provided in the preceding paragraph, the Parties shall also discuss and determine the period of confidentiality for that Know-how, which shall be clearly stated in the separate contract to be entered into in accordance with foregoing article, paragraph 3.
3. The Parties shall have confidential obligation stipulated in the separated contract set forth in foregoing paragraph, to Know-how designated in accordance with paragraph 1.

Article 13: Maintenance Expenses of the Relevant Intellectual Property Rights

The Parties shall bear the Maintenance Expenses of the Jointly-Owned Relevant Intellectual Property Rights in proportion to their respective holdings.

Article 14: Exploitation of Relevant Intellectual Property Rights for Internal Use

Either Party may exploit the Relevant Intellectual Property Rights for internal non-commercial purposes of research without paying consideration, such as royalties, to the other Party to the extent it complies with the duty of confidentiality set forth in Article 8 and confidential obligation of designated Know-how set forth in Article 12.

Article 15: Granting a License to a Third Party

1. Concerning Jointly-Owned Relevant Intellectual Property Rights, when either Party seeks to transfer its holdings of such rights or to grant a license to use such rights to a third party, a prior notice to that effect shall be given to the other Party in order to obtain a written consent of the other Party.
2. If either Party notifies the other Party seeking the consent to grant a non-exclusive license pursuant to the foregoing paragraph, the other Party receiving that notice shall not withhold its consent.
3. Concerning the Relevant Intellectual Property Rights, regardless of whether solely-owned or jointly-owned, for the purpose of granting a license to use such rights to a third party, when the owner Party seeks to disclose or provide the jointly-owned and/or the other Party's technical information as the Results to the concerned third party and gives the other Party a notice of the effect specifying the cause and the disclosure destination, the receiving Party shall not withhold its consent, excluding the case when such technical information is solely owned by the receiving Party.
4. When disclosing or providing the technical information stipulated in the foregoing paragraph to the third party, the disclosing Party shall impose a confidential obligation on the concerned third party in advance.

Article 16: Licensing Contract with a Third Party

1. When either Party intends to grant a license to exploit the Jointly-Owned Relevant Intellectual Property Rights to a third party, the Parties may enter into a separate licensing contract with that third party stipulating payment of royalties and other necessary matters after the consent by the other Party set forth in foregoing article paragraph 1.
2. The Parties shall be entitled to receive royalties in proportion to its holdings at the exploitation of the Jointly-Owned Relevant Intellectual Property Rights by the licensing contract set forth in the foregoing paragraph.

Article 17: Waiver of Relevant Intellectual Property Rights

If either Party waives its holdings in the Jointly-Owned Relevant Intellectual Property Rights, that Party shall give a prior written notice to that effect to the other Party. In such case, the Party receiving the notice may request consultation on how to treat the said Relevant Intellectual Property Rights.

Article 18: Moral Rights of Author

Each of the Parties shall require its own Research Participant who is the author of the concerned Programs not to exercise moral rights of author which is stipulated in Article 6bis, Berne Convention for the Protection of Literary and Artistic Works unless the copyright holder of the concerned Programs is each of the Parties.

Article 19: Preservation of Jointly-Owned Relevant Intellectual Property Rights

1. If a third party brings an objection, action, litigation, lawsuit or proceedings against the acquisition and maintenance of Relevant Intellectual Property Rights related to a joint Application as referred to in Article 11, paragraph 2, the Parties shall cooperate with each other in acquiring and maintaining those Relevant Intellectual Property Rights. Sharing of the expenses in this connection shall be determined in accordance with the contract on sharing of the Intellectual Property Rights referred to in Article 11 paragraph 3.
2. The Parties shall consult with each other to determine how to handle any litigation for infringement of a third-party's patent or other rights that may be filed by the third party against the Jointly-Owned Relevant Intellectual Property Rights.

Article 20: Infringement by Third Party

If a third party infringes on the Jointly-Owned Relevant Intellectual Property Rights, the Parties shall consult with each other to determine how to handle such infringement.

Article 21: Cause of Early Termination

1. The Parties may terminate this Contract prior to the expiration of the term, if they mutually agree that any of the following occurs:
 - (1) Purpose of this Joint Research has been accomplished;
 - (2) Accomplishment of the purpose of this Joint Research becomes difficult due to any reasons other than force majeure;
 - (3) Performance of this Joint Research becomes difficult due to termination or alteration of the AIST's Medium to Long-Term Plan, or
 - (4) Any situation other than those listed in the preceding three items which compels termination of the Contract.
2. Each of Parties shall take no responsibility about all damages or losses incurred to the other Party as a result of a termination of the Contract pursuant to the foregoing paragraph.

Article 22: Termination of the Contract

1. Either Party may immediately terminate this Contract when the other Party falls under any one of the following events:
 - (1) in the event either Party breaches this Contract and subsequently receives from the other Party the notice of such default with a cure period of at least ten (10) days, provided that the breaching Party fails to cure such default within the period;
 - (2) if a government agency with jurisdiction cancels or suspends the right to do business;
 - (3) if the Party's checks or drafts are not honored, or if the Party is subject to provisional seizure, provisional disposition, or compulsory execution;
 - (4) if either Party becomes insolvent, or if proceedings are instituted against the Party for corporate rehabilitation, company arrangement, special liquidation, or corporate reorganization; or
 - (5) if the Party has adopted a resolution for dissolution of the Party.

2. Either Party may terminate this Contract if performance becomes difficult due to force majeure, including, but not limited to, natural disaster: fire, storm, flood, or earthquake; war (declared or not), rebellion, revolution, or riots; provided, however, that the Party affected by such an event shall give the other Party immediate notice of the event.

Article 23: Claim for Damages

1. Either Party may claim for the damages from the other Party under any of the following circumstances:
 - (1) The Party incurs damage because of a breach of this Contract by the other Party.
 - (2) The Party incurs damage by terminating this Contract due to the other Party's default as described in foregoing article paragraph 1.
 - (3) The Equipment managed by the Party or delivered to the other Party's premise was damaged by willful misconduct or negligence of a Research Participant of the other Party.
2. None of the Parties may claim for the liabilities due to any force majeure as described in foregoing article paragraph 2.

Article 24: Consequences of Termination

1. After the completion of the Joint Research, each of the Parties shall immediately return to the other Party or dispose of Confidential Information which has been provided by the other Party in accordance with instructions from that Party.
2. After the completion of the Joint Research, each of the Parties shall remove the Equipment delivered to the other Party's premises pursuant to Article 6, Paragraph 2, in accordance with instructions from the other Party.
3. The foregoing paragraph notwithstanding, each of the Parties may, after the completion of the Joint Research and with the consent of the other Party, transfer to the other Party free of charge the Equipment delivered to the premises of the other Party.

Article 25: Continuing Obligations of Research Participants

Each of the Parties shall require its own Research Participants to observe the provisions of Article 7 and 8 and such obligation shall continue even after the employment relationship with the respective Party ends.

Article 26: Prohibition of Transferring Contractual Rights and Obligations

Neither Party may, without a prior written consent of the other Party, transfer to a third party all or parts of the rights and obligations under this Contract. The same applies to transfer of such rights and obligations as a package with business operations and marketing.

Article 27: Term of the Contract and Survival

1. The term of this Contract shall be as provided for in Article II of Special Conditions.
2. The foregoing paragraph notwithstanding, the provisions of Article 9 shall be valid until the presentation of reports referred to therein; the provisions of Articles 11 through 20 shall remain valid while the Relevant Intellectual Property Rights referred to in the respective Articles continue to exist; the provisions of Article 10, paragraph 1 and 2, Articles 24, 26, 28 and Article 29, paragraph 2 shall survive the termination of this Contract; the provisions of Article 10, paragraph 3 shall remain valid for one (1) year after the termination of this Contract; and the provisions of Articles 7, 8, 23 and 25 shall remain valid for three (3) years after the termination of this Contract.

Article 28: Dispute Resolution

The Parties shall follow the applicable laws and regulations regarding matters not provided for in this Contract and questions arising from the interpretation of this Contract and seek to resolve them through mutual consultation in good faith. The resulting

resolution shall be incorporated into this Contract in the form of an amendment thereto. All disputes arising out of this Contract shall be resolved amicably where possible. If a means of resolving a dispute cannot be found, the said dispute shall be finally settled by binding arbitration in accordance with, unless otherwise agreed to in writing, the UNCITRAL (United Nations Commission on International Trade Law) Arbitration Rules as at present in force. If CMU requests arbitration, the arbitration shall take place in Tokyo, Japan; if AIST requests arbitration, the arbitration shall take place in Bangkok, Thailand. The language to be used in the arbitral proceedings shall be English.

Article 29: Compliance with Export Control Laws and Regulations and Non-Military Use

1. In transferring goods and/or technologies, each of the Parties shall comply with the export control laws and regulations of Japan and Thailand, and obtain all necessary approval if required by such laws and regulations. Should one Party request the other to provide information necessary for the aforementioned procedures, the requested Party shall promptly provide said information.
2. Neither Party shall use the Results, goods and/or technologies, and duplications thereof, obtained under this Contract for the purposes of developing, manufacturing, using, or storing Weapons of Mass Destruction (nuclear weapons, chemical weapons, biological weapons, or missiles to transport such weapons), or for any other purposes that interfere with maintaining international peace and security. Nor shall either Party provides the aforesaid Results, etc. to any third party who, to the best of either Parties' knowledge, intends to use same for the aforementioned purposes.

Attachments

Attachment 1: Scope of Work and Responsibility

Work Proposal by AIST

1. Exploration of Co-less thermoelectric oxide materials and production of devices
2. Preparation of thermoelectric module utilizing new oxide materials
3. Evaluation and demonstration test of oxide thermoelectric modules

Work Proposal by CMU

1. Exploration of n-type thermoelectric materials by machine learning and production of devices
2. Design of thermoelectric modules for maximizing generation output
3. Design and produce prototype of thermoelectric units for application utilizing industrial waste heat

Attachment 2: Research Participants

AIST

Participating Researcher

Position: Principal Researcher

Name: FUNAHASHI Ryoji

Affiliation: Research Institute of Core Technology for Materials Innovation

Whether to be located at CMU: No

Research Assistant

None

CMU

Participating Researcher

Position: Thermoelectric Project Coordinator

Name: Anucha Watcharapason

Affiliation: Chiang Mai University

Whether to be located at AIST: No

Position: PMUC Project Leader

Name: Orawan Khamman

Affiliation: Chiang Mai University

Whether to be located at AIST: No

Research Assistant

None