

# Project Name: International Joint Research of Innovative Thermoelectric Devices and Advanced Evaluation Technology (2020–2023\*)

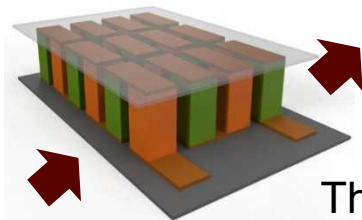
\*scheduled



Entrusted party: National Institute of Advanced Industrial Science and Technology (AIST)

## Outline of the project

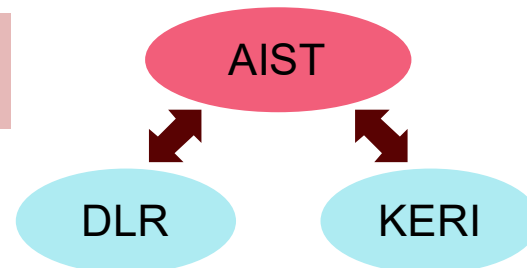
- **Background of the project:** Substantial reduction in GHG by thermoelectric waste heat recovery in vehicles and industrial processes and energy harvesting
- **Purpose of the project:** Development of high-efficiency and highly reliable thermoelectric power generation devices. Establishment of international framework for developing high-accuracy evaluation methods.
- **R&D content:** By combining state-of-the-art technologies in Japan and overseas, power generation performance and the reliability of thermoelectric devices can be improved under harsh conditions, such as large temperature gradients of 100 °C/mm or more. The accuracy of thermoelectric evaluation methods can be improved to  $\pm 5\%$  or less through international mutual evaluation.



Improved efficiency and reliability

Thermoelectric device

Combining cutting-edge technologies of CNRS-CRISMAT, CEA-LITEN, AIST, and so on



Sophisticated evaluation methods through international collaboration

## Project scheme

NEDO

Funding



AIST

Joint R&D contract



CRISMAT, French National Centre for Scientific Research (CNRS),

LITEN, French Alternative Energies and Atomic Energy Commission (CEA) (France),

German Aerospace Center (DLR) (Germany),

The Korea Electrotechnology Research Institute (KERI) (Korea)

## Expected outcomes

- After the 2030s, thermoelectric technology is expected to be applied to power generation and energy harvesting from waste heat. Furthermore, the development of high-accuracy evaluation methods is expected to promote market growth.
- By converting just a small percentage of waste heat from vehicles and industrial processes into electricity, CO<sub>2</sub> reduction of more than 5 million tons/year is expected.
- The technologies developed in this project will be transferred to private companies, hence promoting market growth.

## Significance of international R&D

Utilization of cutting-edge technologies developed in international research institutes and establishment of international framework for evaluation methods.

- CNRS-CRISMAT: Study of the thermoelectric materials and devices using state-of-the-art transmission electron microscopy technology.
- CEA-LITEN: Search for new high-performance materials using computational science and informatics
- DLR and KERI: Development of advanced power generation evaluation methods by establishing an international framework