

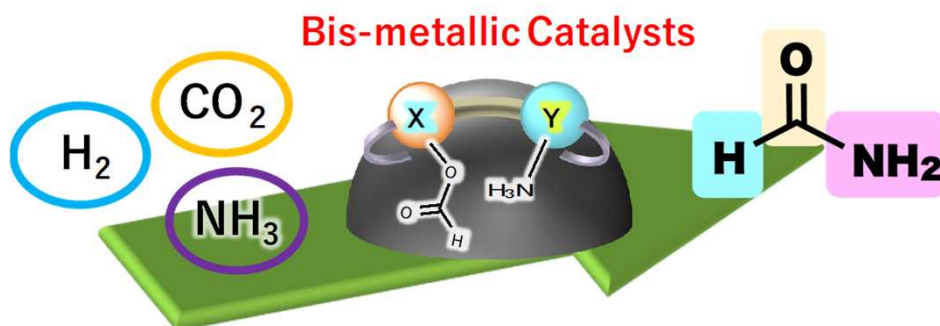
# Project Name: Chemical Productions Through Formate Intermediates by Solid Bis-Metallic Catalysts (2020–2023)

Entrusted parties: National Institute of Advanced Industrial Science and Technology (AIST), Hiroshima University, Kanagawa University



## Outline of the project

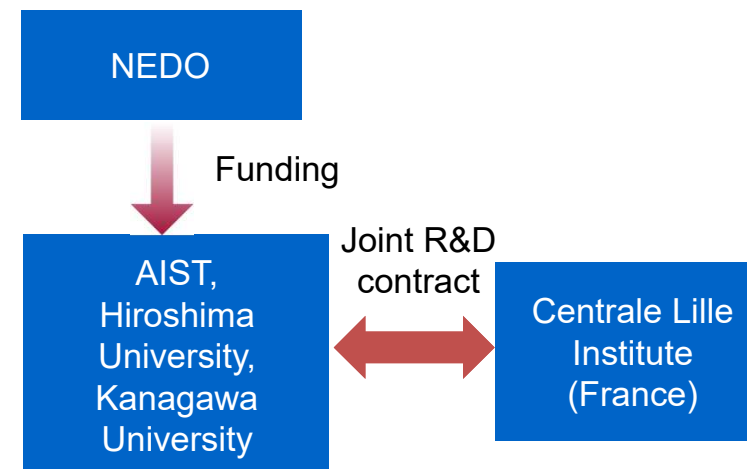
- **Background & purpose:** It is advantageous to advance the technologies for fine chemical productions to enable CO<sub>2</sub> reductions to achieve a sustainable society. This project aims to design and develop a novel solid bimetallic catalyst to directly produce fine chemicals with amides such as formamide using CO<sub>2</sub> and H<sub>2</sub> as raw materials.
- **Research:** Design and synthesis of solid bimetallic catalysts and develop a direct amide synthesis process that can obtain the selectivity of more than 80% through the formation of formate from CO<sub>2</sub> and H<sub>2</sub>.



## Significance of international R&D

- The international joint research is carried out with Centrale Lille Institute (CL), which is one of the EU's top research institutes in the research field of chemical engineering and solid catalysts and has broad experience undertaking joint research with other countries around the world.
- The collaboration with AIST and CL's group of solid catalyst experts is expected to advance research by REALCAT (established in UCCS), a platform gathering high-throughput (HT) equipment for catalysis, which is used to optimize the catalytic reaction conditions for direct amide synthesis through catalyst screening based on distance between each metal element and their huge combinations.

## Project scheme



## Expected outcomes

- In 2030, the catalyst technologies expect to pioneer the production of high value-added products containing nitrogen from CO<sub>2</sub> as a carbon neutral cycle.
- Estimated CO<sub>2</sub> reduction amount (direct: 1.4 M ton-CO<sub>2</sub>/year with 50% of this process introduced, total: 8.4 M ton-CO<sub>2</sub>/year even with a conservative estimate of 40% introduced)
- There is an expected benefit of 250 billion JPY for the fine chemical products market if 25% of its process is replaced by the novel system.