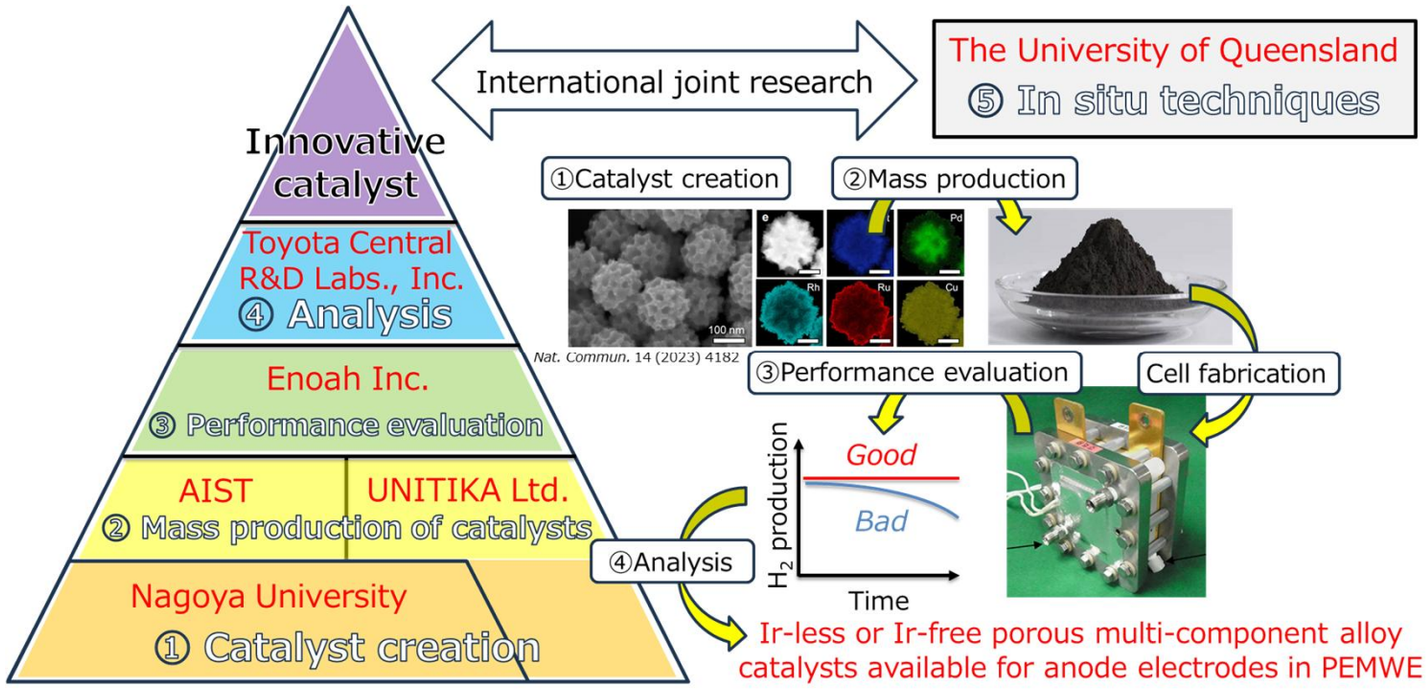
Project Title: International Collaborative R&D on Innovative Porous Multi-Component Alloy Catalysts for Water Electrolysis (scheduled for 2025-2028)

Entrusted Parties: National Institute of Advanced Industrial Science and Technology (AIST), Tokai National Higher Education and Research System (National University Corporation Nagoya University), UNITIKA Ltd., Enoah Inc., Toyota Central R&D Labs., Inc.

Outline of the Project

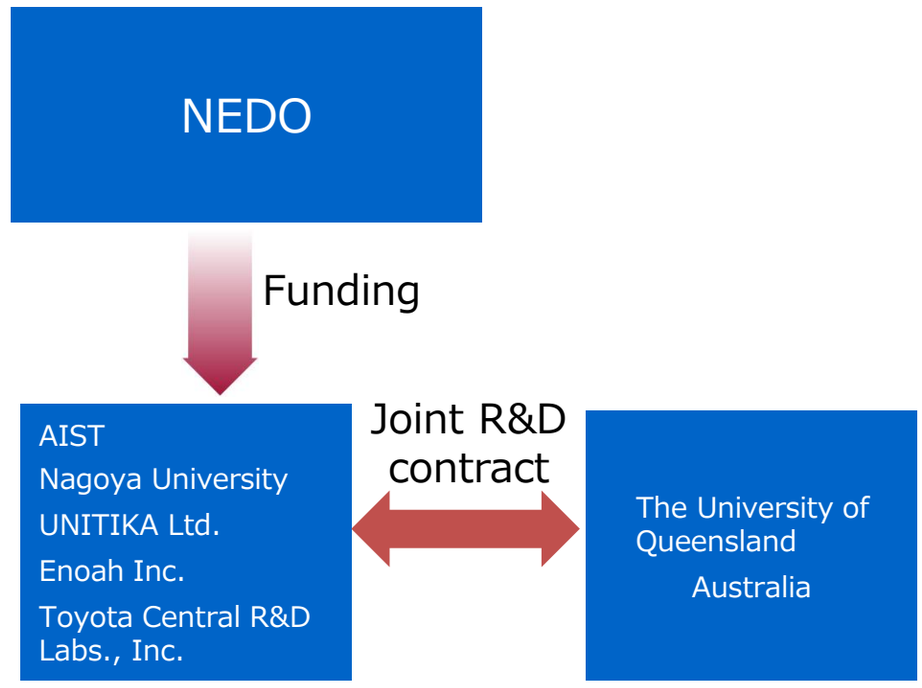
- **Background:** Proton exchange membrane (PEM) water electrolyzers require iridium catalysts for their anode electrodes, but the expense and risk of resource scarcity are barriers to widespread adoption.
- **Objective:** To create a porous multi-component alloy catalyst with less or no iridium that exhibits high performance and durability at the single-cell level.
- **Research content:** To develop catalysts, mass-production technologies for catalysts, and single-cell analysis methods with evaluation criteria for practical application.



Significance of International R&D

- The University of Queensland's Centre for Microscopy and Microanalysis is capable of in-situ observation at the atomic or molecular level using electron microscopes. This will allow powerful insights into reaction mechanisms and lead to the development of improved catalysts.

Project Scheme



Expected Outcomes

Possible practical applications after 2040

- Creation of porous multi-component alloy catalysts will contribute to the widespread adoption of PEM water electrolyzers.
- Market expansion of water electrolyzers is expected in countries with abundant renewable energy resources, such as Australia.

Estimated economic impact in 2040

- PEMWE market size = JPY 360 billion/year
- Anode electrode market size = JPY 12 billion/year (approximately 3% of electrolyzer costs)