

TECH OFFER

AI-Driven Autonomous System for Rapid Energy Material Discovery



KEY INFORMATION

TECHNOLOGY CATEGORY:

Energy - Fuel Cells

Infocomm - Artificial Intelligence

Infocomm - Robotics & Automation

Materials - Semiconductors

Chemicals - Organic

TECHNOLOGY READINESS LEVEL (TRL): **TRL4**

COUNTRY: **JAPAN**

ID NUMBER: **TO175286**

OVERVIEW

This technology integrates artificial intelligence (AI) and robotics to create an autonomous experimentation system, aimed at significantly accelerating the discovery and development of energy materials. Traditionally, research and development (R&D) cycles in materials science are slow and resource-intensive, often taking years or even decades to produce meaningful results. However, this technology can reduce these timelines to under one month by leveraging advanced AI algorithms and robotic automation to optimize experimental processes in real-time.

The system is designed to continuously refine experimental parameters based on data insights, enabling rapid prototyping and validation of new materials. This makes it a powerful tool for industries seeking to innovate within the renewable energy sector, as it allows for faster material discoveries and shorter times to market. The system's precision, speed, and ability to handle high-

throughput experimentation offer substantial benefits for energy-related applications, including the development of battery, fuel cell, and solar cell materials to name a few.

The technology owner is seeking R&D projects, out-licensing and test-bedding opportunities with interested parties to develop new materials for energy, pharmaceutical industry and automotive applications.

TECHNOLOGY FEATURES & SPECIFICATIONS

This technology combines AI-driven models with robotics to create a fully autonomous platform capable of high-throughput experimentation for new material discovery. Key features of the system include:

- **AI-Driven Experiment Optimization:** The system employs AI not only for designing new materials and predictive modelling but also for automatic analysis and real-time interpretation of experimental data, continuously improving its processes.
- **Robotic Automation:** The system ensures precision in material synthesis and characterization through robotic automation, allowing for reproducibility and scalability.
- **Closed-Loop Feedback:** Each experiment's data is fed back into the AI system to guide future experimental efforts, enhancing both the speed and accuracy of material discovery

The technology outperforms traditional R&D timelines, serving as a shortcut in the innovation cycle, going from a problem statement to productisation in a more rapid manner.

POTENTIAL APPLICATIONS

This autonomous experimentation system is highly suited for industries that require rapid and efficient material development, such as:

- **Energy Storage and Conversion:** High-performance batteries, solar cells, and fuel cells
- **Aerospace and Automotive:** Lightweight materials, advanced polymers, and coatings
- **Electronics:** Semiconductor materials and other components requiring fast development cycles

UNIQUE VALUE PROPOSITION

- Accelerates R&D lead times through a combination of AI and robotics
- Enables automatic analysis and interpretation of experimental data, shortening the linear R&D processes
- High speed, accuracy, and cost-effectiveness in the discovery and development of advanced materials