

Energy Conversion and Energy Storage

R&D Project Title: Novel electrolyte design based on control of electrostatic interactions

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Summary:

In this R&D project, we focus on controlling intermolecular and interionic interactions based on electrostatic interactions, with the aim of developing novel electrolytes by organically combining active materials, supporting electrolytes, and solvents.

The electrolyte design strategy centers on optimizing electrostatic interactions and solvation through operando X-ray analysis. Data will be analyzed via large reasoning models for efficient electrolyte development. Solar and wind power require energy storage systems for grid stability. While vanadium electrolytes suit long-duration storage, they face resource constraints. Novel redox flow batteries could reduce costs to 20,000–30,000 yen/kWh, supplying 9.8 billion kWh annually and cutting CO₂ emissions by 4.63 million tons.

