

Project Number: 2026-Green Car-Integrated-10-02

International Joint R&D of Future Mobility (Automotive)

Development of Integrated Design Technology for High-Energy-Density Lithium Metal Battery Cell, Module, and Pack Systems for Electric Vehicles

1. Project Information

Agreement period, R&D Expenses, and Implementation Structure:

- Within 45 months (Development period of Year 1: 9 months, Year 2 to 4: 12 months each).
- R&D expenses: Within KRW 3 billion in 2026 (within total government contribution of KRW 15 billion).
 - (Integrated) Within KRW 500 million (within total government contribution of KRW 200 million). Refer to each RFP for the subprograms.
- Lead Organization: Open to all
- Government Technology Fee Payment Obligation: Not Applicable

2. Concept/Objective

Concept:

- To achieve a break-through increase in electric vehicle driving range and maximize driving performance through the integrated development of high-energy-density/high-power cell technologies that surpass the limitations of conventional lithium-ion batteries and active pressure-controlled module/pack systems that structurally manage the volumetric expansion of lithium metal batteries.
- To secure reliability for early commercialization and global market entry by maximizing technological maturity and enabling early resolution of key technical challenges associated with lithium metal batteries through joint research that combines advanced analytical and precision diagnostic core technologies with differentiated cell, module, and pack manufacturing process technologies.
 - Need for battery technology development that takes into account the potential expansion of battery environmental regulations, including the EU CRMA.

Details of development:

- Development of high-energy-density/high-power lithium metal battery cell technologies for electric vehicles
 - Development of manufacturing technologies for large-capacity and high-power 900 Wh/L-class lithium metal battery cells
 - Development of mass-production process technologies for high-reliability lithium metal battery cells and evaluation of cell reliability
 - Development of non-destructive imaging, degradation analysis, and cell anomaly diagnosis technologies for cells and modules

- Development of high-energy-density module and pack technologies for electric vehicles based on lithium metal batteries
- Development of thin, high-stiffness end plate design technologies
- Development of module structures applying multi-axial active pressure control technologies
- Development of real-time monitoring technologies for pressure and temperature distributions
- Development of modules and packs incorporating heat propagation prevention structures based on simulation-driven optimization of gas venting structures
- Design and thermal management simulations to minimize temperature deviation within the battery pack
- Fabrication of pressure-controlled module prototypes applying lithium metal batteries, along with reliability evaluation and demonstration

3. Rationale for Government Support and Fields of Application

- (Technical Aspect) Need for cell-to-module integrated technology development
- Necessity to secure exclusive technological leadership in lithium metal batteries, a game-changing technology in the increasingly competitive electric vehicle driving range market.
- Requirement for active pressure control technologies that physically suppress cell volumetric expansion and dendrite growth at the module level in order to ensure the lifetime and safety of next-generation lithium metal batteries.

Fields of Application

- Battery systems for propulsion in premium electric vehicles and Urban Air Mobility (UAM)
- Expanded application as a general-purpose module platform for next-generation battery systems, including all-solid-state batteries and high-silicon-content batteries

4. Agency Contacts

For questions relating to request for proposal contact: Department of Battery, Electronics & Display
TEL : 82-53-718-8277, EMAIL: ysjtop@keit.re.kr, seasand@keit.re.kr

Project Number: 2026-Green Car-Integrated-10-02

International Joint R&D of Future Mobility (Automotive)

Development of Integrated Design Technology for High-Energy-Density Lithium Metal Battery Cell, Module, and Pack Systems for Electric Vehicles

- New R&D Project for the Development of Manufacturing Technology for 900 Wh/L-Class High-Energy-Density Lithium Metal Battery Cells for Electric Vehicles

1. Project Information

Agreement period, R&D Expenses, and Implementation Structure:

- Within 45 months (Development period of Year 1: 9 months, Year 2 to 4: 12 months each).
- R&D expenses: Within KRW 1.4 billion in 2026 (within total government contribution of KRW 7 billion).
- Lead Organization: Small and Medium-Sized Enterprises (SMEs)
- Government Technology Fee Payment Obligation: Applicable

2. Concept/Objective

Concept:

- To achieve a break-through increase in electric vehicle driving range and maximize driving performance, development of high-reliability cell manufacturing and mass-production technologies based on large-capacity lithium metal batteries that simultaneously deliver high energy density and high-power output beyond the limitations of conventional lithium-ion batteries.
- To secure reliability by leveraging advanced analytical and precision diagnostic technologies to conduct in-depth analysis of the electrochemical and mechanical behavior of domestically developed large-capacity lithium metal battery cells and to provide design feedback based on the analysis.

Core Objective: Cell energy density (≥ 900 Wh/L)

Details of development:

- Development of high-energy-density/high-power lithium metal battery cell technologies for electric vehicles
- Development of manufacturing technologies for 900 Wh/L-class high-power, long-life lithium metal battery cells
- Development of mass-production process technologies for large-capacity lithium metal battery cells and reliability evaluation
- Development of non-destructive imaging, degradation analysis, and cell anomaly diagnosis technologies for cells and modules

R&D proposals must specify quantitative targets and commercialization levels for the following items:

- Cell energy density (Wh/L)
- Cell capacity (Ah)
- Cell capacity variation (Ah)
- Continuous cell power performance (C-rate)
- Cycle life characteristics (%)
- safety evaluation (Pass)

3. Rationale for Government Support and Fields of Application

• (Technical Aspect) Securing core technologies to overcome the limitations of conventional lithium-ion batteries

- Essential to secure lithium metal battery cell manufacturing technologies capable of overcoming the physical limitations of current lithium-ion batteries and achieving a volumetric energy density of 900 Wh/L or higher.

Fields of Application

- Power batteries for future mobility applications, including premium electric vehicles and Urban Air Mobility (UAM)

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International Joint R&D of Future Mobility (Automotive)

Development of Integrated Design Technology for High-Energy-Density Lithium Metal Battery Cell, Module, and Pack Systems for Electric Vehicles

- New R&D Project for the Development of Module and Pack System Technologies for 600 Wh/L-Class Lithium Metal Batteries for Electric Vehicles

1. Project Information

Agreement period, R&D Expenses, and Implementation Structure:

- Within 45 months (Development period of Year 1: 9 months, Year 2 to 4: 12 months each).
- R&D expenses: Within KRW 1.55 billion in 2026 (within total government contribution of KRW 7.8 billion).
- Lead Organization: Small and Medium-Sized Enterprises (SMEs)
- Government Technology Fee Payment Obligation: Applicable

2. Concept/Objective

Concept:

- To physically suppress volumetric expansion and dendrite growth in lithium metal batteries and optimize performance through the development of module and pack system technologies based on active pressure control at the module level.
- To secure lithium metal battery-specific packaging technologies that apply thin, high-stiffness end plates in order to minimize energy density loss caused by pressure-applied module structures, while maintaining and realizing the cells' intrinsic performance at the module and pack levels.
- To implement high-reliability pack systems that simultaneously ensure driving lifetime and fire safety through the development of simulation-based thermal management technologies that minimize temperature deviation within the pack and heat propagation prevention technologies based on optimization of gas venting structures.

Core Objective: Module energy density (≥ 900 Wh/L)

Details of development:

- Development of high-energy-density module and pack technologies for electric vehicles based on lithium metal batteries
- Development of thin, high-stiffness end plate design technologies to simultaneously secure a module energy density of 600 Wh/L and cell pressure durability
- Development of module structures applying multi-axial active pressure control technologies to

accommodate volumetric expansion and pressure response of lithium metal batteries

- Development of real-time monitoring technologies for pressure and temperature distributions to secure the precision of active pressure control and enable accurate diagnosis of cell conditions within modules
- Development of modules and packs incorporating heat propagation prevention structures based on simulation-driven optimization of gas venting structures
- Design and thermal management simulations to minimize temperature deviation within the pack to secure operational reliability
- Fabrication of pressure-controlled module prototypes applying lithium metal batteries, along with reliability evaluation and demonstration to verify design validity

R&D proposals must specify quantitative targets and commercialization levels for the following items:

- Module energy density (Wh/L)
- Module pressure deviation (%)
- Pack simulation models (number of cases)

3. Rationale for Government Support and Fields of Application

- (Technical Aspect) Overcoming material limitations through mechanical control
- Volumetric expansion and dendrite growth in lithium metal batteries are difficult to address through material improvements alone, making precise module-level pressure control technologies an essential complementary approach.

Fields of Application

- Deployment as propulsion battery packs for premium electric vehicles and Urban Air Mobility (UAM)
- General-purpose module platform for next-generation battery systems, including all-solid-state batteries and high-silicon-content batteries

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