

# **Theme : Next Generation Battery**

## **Subject : Battery Management System of Long Range Lithium-Ion Battery for Electric Vehicles**

### **Introduction**

The goal of this research project is to explore novel battery management systems and/or new algorithms that can improve the safety and stability for long range lithium-ion battery for electric vehicles.

### **Scope**

Challenges that significantly advance the state-of-the-art energy density and/or power density in lithium battery technologies include:

- Battery management system and/or algorithm to maximize the fuel efficiency and prolong the drive distance for lithium-ion battery for electric vehicles
- Methods to Improve stability and/or safety for high voltage and/or high capacity energy storage device
- Reliable method to detect capacity and/or impedance degradation of the cell, with shallow DoD operation range.
- Reliable method to ensure the safety of the system, where hundreds or thousands of cells are connected.
- Combination of the above

### **Research questions**

We are interested in the following research questions. These questions are not exhaustive but different research questions are open to discuss with research partners.

- What would be the most promising method for maximize the fuel efficiency and prolong the drive distance for lithium-ion battery for electric vehicles?
- How can predict the degradation of the batteries and optimize the profiles of charging, discharging and switching?
- What are the mechanisms influencing the safety and lifetime of the batteries?

### **Expected Deliverables**

The following is open to discussion:

- Suggestion of new battery management system and/or algorithms
- Progress reports every 3 months summarizing accomplishments
- Prototype samples
- Patents with Samsung SDI (if agreed)