Lithium Lanthanum Titanate Solid Electrolyte for All-Solid-State Lithium-Ion Battery

Purumet Pipitworrakul (ปุรุเมธ พิพิธวรกุล)* Dr. Nonglak Meethong (ดร.นงลักษณ์ มีทอง)**
Dr. Sutham Srilomsak (ดร.สุธรรม ศรีหล่มสัก)***

ABSTRACT

Safety is one of the most important criterions to design Li-ion batteries (LIB) for electric vehicles (EV). Although, a battery pack for EV has an efficient battery management system inside, current LIB cells still use flammable organic solvents as an electrolyte. In case of an accident, the flammable liquid electrolyte inside the batteries may leak and cause catastrophic failure. Therefore, new and safer electrolytes based on solid ionic conductive materials have been introduced to replace the liquid electrolytes. Lithium lanthanum titanate (LLTO) is a promising solid state electrolyte for all solid state LIBs due to its demonstrated high bulk ionic conductivity.

However, LLTO has relatively low grain boundary conductivity, limiting the overall material conductivity. The purpose of this research is to synthesis co-doped Sr and Al on LLTO material. In addition, lithium silicate will be used to coat on the surface of LLTO. This strategy should improve both ionic conductivity of the grain and grain boundary of LLTO materials to be suitable for use in all solid state LIB for EV applications.

Keywords: All-solid-state Li-ion batteries, Solid electrolyte, Lithium lanthanum titanate

* Student, Master of Science Program in Materials Science, Department of Physics, Faculty of Science, Khon Kaen University
** Assistant Professor, Institute of Nanomaterials Research and Innovation for Energy (IN-RIE) and Department of Physics, Faculty of Science, Khon Kaen University
*** Associate Professor, Institute of Nanomaterials Research and Innovation for Energy (IN-RIE) and Department of Physics, Faculty of Science, Khon Kaen University