

## Abstract

### Improving electrolytes for Lithium-ion and Lithium-oxygen batteries

There is an ever increasing demand for fossil fuels. Lithium ion batteries (LIBs) can effectively reduce the production of greenhouse gases and lessen the need for fossil fuels<sup>1</sup>. LIBs also have great potential in electric vehicle applications as an alternative to petroleum modes of transportation. Understanding the chemical reactions between the electrolyte and electrodes in LIBs is very crucial in developing batteries which can work over a wide temperature range and also give a wide potential window. The Solid Electrolyte Interface (SEI), formed by the reduction of solvent molecules on the surface of electrodes, is an important component of LIBs. The SEI is very essential to the performance of LIBs. The mechanism of formation of the SEI and the basic components of the SEI will be presented. Methylene ethylene carbonate, used as high temperature performance additive for LIBs will also be discussed<sup>2</sup>.

Lithium-Oxygen batteries have an energy density ten times greater than that of LIBs. However, lithium-oxygen batteries have rechargability problems associated with them. The most common electrolyte used in this type of batteries is LiPF<sub>6</sub> in carbonate or ether based solvents<sup>3</sup>. LiPF<sub>6</sub> inherently decreases electrolyte stability, since LiPF<sub>6</sub> can undergo thermal dissociation into PF<sub>5</sub> and LiF. PF<sub>5</sub> being a strong Lewis acid, can react with electron rich species<sup>4</sup>. A great quantity of research has been done on the insoluble decomposition products formed during the discharge of Li-O<sub>2</sub> batteries<sup>5</sup>. The solid decomposition products formed during the discharge of Li-O<sub>2</sub> batteries depend upon the type of solvent used<sup>5-7</sup>. The thermal decomposition reactions of LiPF<sub>6</sub> based electrolytes are studied in detail with regard to LIBs<sup>4</sup>. The comprehensive study done on thermal degradation of electrolyte in Li-O<sub>2</sub> batteries will be presented.

#### References:

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