특별강연

Lithium Metal Electrode for Polymer Batteries
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The lithium metal electrode is attractive as an anode for lithium polymer batteries due to its high energy density (3830 mAh/g, 2045 mAh/㎤)and a larger window opportunity for the cathode materials. However, the thermodynamic instability of lithium electrode in contact with most non-aqueous electrolytes leads to the formation of SEI(solid electrolyte interphase) layers and the dendritic growth of lithium on electrode surfaces that can results in an unexpected electrochemical behavior such as the capacity loss, the low cycling efficiency, and the poor cyclability. The SEI layer is formed on the lithium metal surface by the reaction of lithium with water trace, other impurities, organic solvent, and salt. It acts as an interphase between the lithium electrode and the polymer electrolyte. It is quite important to control the electrode/polymer electrolyte interface to obtain the higher energy density and the good cycling efficiency of the batteries. Much effort has been expended to improve the uniformity of the SEI layer through the modification of the lithium metal. Protecting reactive lithium metals by covering their surface with organic coatings is one of the smart ways to prevent them from corrosion or to minimize the passivation phenomena on lithium metal surface.

In this work, the protection polymer thin film is formed on the lithium electrode surface by means of the ultra violet (UV) radiation-curing of the curable mixture containing crosslinking agent, liquid electrolyte, and photoinitiator. This protection layer is aimed to lead to produce sufficient charge transfer reaction on lithium electrode, enhance the physical contact between the polymer electrolyte and the lithium metal, minimize the decomposition reaction of the liquid electrolyte to the metallic lithium surface, and develope the uniform SEI layer by suppressing the formation of the lithium dendrite. The effect of protection layer on the interfacial stability was discussed and the morphology of SEI layer formed on bare and protected lithium electrode under the electrochemical environment was also investigated.