A Study on the Electrochemical Properties of Polymer Sulfur Electrode according to Conductive Material Types

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Demand and use of electric vehicles (EVs) is rapidly increasing due to environmental pollution problems. However, electric vehicles have a big disadvantage of short travel distance To overcome these disadvantages, many batteries have recently been studied that use high energy density active materials. Among them, Li-S batteries have a high capacity of 1650mAh / g, are cheap and environmentally friendly, attracting the attention of many researchers. However, due to the polysulfide elution, shuttle phenomenon and low conductivity, there is a problem of reduction in capacity and deterioration in cycle performance.

Recently, a lot of have been done to solve the polysulfide elution inhibition. Among them, a Pyun group of the University of Arizona synthesized a polymer type active material by adding organic sulfur additive in molten sulfur. The synthesized active material inhibited the elution of polysulfide and confirmed the improvement of the cycle performance. However, they have not optimized Li-S batteries and have not verified the optimization of conductive materials to improve their conductivity property.

In this study, the same synthetic method as the Pyun group was used to produce an active materials that inhibits polysulfide elution and shuttle phenomenon. At this time, the electrode was manufactured by changing the kind of the conductive materials contained in the electrode. And we assembled the 2032 type cell. The fabricated cell was electrochemically evaluated to select a suitable conductive material for the Li-S battery.

References:

[1] Adam G. Simmonds, et. al. Inverse Vulcanization of Elemental Sulfur to Prepare Polymeric Electrode Materials for Li-S batteries journal of ACS Macro Lett. 2014, 3, 229−232.