

Aerosol Synthesis of Silicon/Graphene Composite Powder using PVP Modification for Advanced Li-Ion Batteries

최승호, 강윤찬¹, 박승빈, 최장욱^{2,†}

KAIST; ¹고려대학교; ²KAIST EEWS

(jangwookchoi@kaist.ac.kr[†])

Silicon (Si) has been lately investigated as high capacity anode materials for lithium-ion batteries (LIBs) to replace commercial graphite electrodes that have low specific capacity. However, the practical implementation of Si anodes is greatly hindered by the large volume change of Si during the lithium insertion/extraction process. This volume change causes pulverization of Si and loss of electric contact with the current collector, resulting in an insufficient cycle life. Therefore, it is highly important to develop a novel structured electrode that is capable of accommodating the large volume change and that can form a stable Si electrode without fracture.

Herein, a simple method of systematically synthesizing the uniform Si/graphene composite powder by one-step spray pyrolysis process was first introduced. The used polyvinylpyrrolidone (PVP) acted as the stabilizer of Si NPs, and graphene oxide sheets to prevent the agglomeration in precursor solution. The uniform Si/graphene composite powder as anode materials for LIBs showed superior electrochemical properties.