Synthesis of graphene-mesoporous silicon composite for electrochemical application

김경환, 조경민, 정희태*
KAIST
(heetae@kaist.ac.kr*)

Silicon is an attractive anode material for lithium-ion batteries because it has a low discharge potential and the highest theoretical charge capacity. Therefore, Si is a promising candidate as a second electrochemically active phase to incorporate into carbon based electrode for higher specific capacity. Here, we synthesized the cylindrical mesoporous structure of SiO2 formed parallel to the surface of the reduced graphene via the ternary cooperative assembly of a triblock copolymer, the silica precursor, and graphene. The well-defined mesoporous structure was consisting of conductive carbon and insulating SiO2. Using this material, graphene-mesoporous Si composite can be produced by reducing the SiO2 using metal catalysts. It has improved electronic conductivity where graphene functions as a highly efficient conductive additive, the composite can successfully prevent graphene from stacking. Therefore, the graphene-Si composite is very promising for the electrochemical applications.