Electrochemical properties of Si/Graphene-based composites through electrostatic self-assembly approach for lithium-ion battery anodes

김나현, 최재호, 오창일, 안성현, 이정규†
동아대학교
(jklee88@dau.ac.kr†)

In order to extend the range of application of lithium-ion batteries (LIBs) to medium-large equipments, advanced anode materials with high energy and power densities have to replace the low-energy graphitic carbon anodes. Among various anode materials, silicon is the most promising material since its theoretical capacity is about 10 times higher than graphite. Unfortunately, silicon nanoparticles (SiNPs), for example, undergo a large volume change (~300%) during cycling, resulting in electrode pulverization, and thus fast capacity fading. In this study, we proposed Si/C composites that can buffer the strain by volume expansion of SiNPs and offer excellent cycling stability at high capacity. For this purpose, amine-functionalized SiNPs were self-assembled on graphene oxide followed by subsequent carbon coating on Si/graphene assemblies to obtain Si/graphene/C composites. Details on the structure of Si/Graphene/C composites and their electrochemical properties as LIBs anodes are to be presented.