Si/Ti_2O_3/Reduced Graphene Oxide Nanocomposite Anodes for Lithium-Ion Batteries with Highly Enhanced Cyclic Stability

박아름, 유필진†
성균관대학교
(pjyoo@skku.edu†)

Silicon (Si) has attracted tremendous attention as a high-capacity anode material for Li-ion batteries (LIB); unfortunately, it suffers from poor cyclic stability due to excessive volume expansion and reduced electrical conductivity after repeated cycles. To circumvent these issues, we propose a ternary nanocomposite of Si/Ti_2O_3/reduced graphene oxide (rGO) using mechanical blending and subsequent thermal reduction process. As a result, the obtained ternary nanocomposite exhibited a specific capacity of 985 mAh/g and a Coulombic efficiency of 98.4% after 100 cycles at a current density of 100 mA/g. This excellent electrochemical performance can be ascribed to the improved electron and ion transport provided by the Ti_2O_3 phase within the Si domains and the structurally reinforced conductive framework comprised of the rGO nanosheets. Therefore, it is expected that our approach can also be applied to other anode materials to enable large reversible capacity, excellent cyclic stability, and good rate capability for high-performance LIBs.