Abstract

The objective of the present research is to develop a silicon-carbon composite anode material with a high density of carbon coating, and evaluate its electrochemical performance to advance the next generation of high performance lithium-ion batteries. The present work utilized a novel two-step coating procedure for the production of the silicon-carbon composite anode material. Results from this study suggest that the silicon-carbon composite anode material has high capacity, high capacity retention, and good reversibility over many cycles. The silicon-carbon composite anode material has the potential to be used in high power applications due to its good rate capability, high energy density, and long cycle life. The results from this study demonstrate that the silicon-carbon composite anode material is a promising candidate for use in future high energy density lithium-ion batteries.

Results for the Silicon-Carbon Microspheres

Integrity and morphology are maintained after cycling (Figure 11), indicating that the material is capable of withstanding the huge volume expansion and contraction during charge and discharge. As a result, the silicon-carbon composite anode material has high capacity, good reversibility, and good rate capability over many cycles. The silicon-carbon composite anode material has the potential to be used in high power applications due to its good rate capability, high energy density, and long cycle life. The results from this study demonstrate that the silicon-carbon composite anode material is a promising candidate for use in future high energy density lithium-ion batteries.