Dispersion homogeneity of silicon particles in the graphite/silicon-based anode slurries and their effects on the cell performance

김경진, 정민환, 안경현†
서울대학교
(ahnnet@snu.ac.kr†)

Silicon is one of the promising anode materials for advanced lithium-ion batteries (LIBs) to reach a much higher energy density than current commercial anodes. However, due to its intrinsic volume change issue (300%) during the lithiation and de-lithiation process, the co-utilization of the small amount of silicon (<10wt%) and commercial graphite has been adopted as an alternative. When the graphite and silicon are mixed in the form of slurries, it is difficult to achieve desired dispersion homogeneity of the silicon particles in the graphite-rich phase due to the low compatibility of the two particles. When the silicon forms the isolated domain of itself in the electrodes, the cyclic stability of the cell could significantly deteriorate. In this context, the dispersion homogeneity of silicon should be controlled from the slurry level. Thus, in this study, the impact of the slurry mixing protocol and binder-silicon interaction on the dispersion state of the silicon in the graphite/silicon slurries has been investigated. And the electrochemical performances of the anodes with different dispersion homogeneity are compared and correlated.