Activated N-doped Porous Hierarchical Structure Carbon derived from Lignin for High performance Lithium-Sulfur Cathode

연정석, 박호석†
성균관대학교
(phs0727@skku.edu†)

N-doped Hierarchical Structure Carbon are synthesised through the facile hydrothermal carbonisation of a lignin precursor, subsequent KOH activation, and a post-doping process. The as-obtained n-hC exhibits a large surface area and pore volume, as well as a high N content. The n-hC is used as a S-hosting material with mass loading of 64.1 wt% through the in situ redox reaction of Na2S2O3. The S@n-hC achieves a high initial discharge capacity of 1295.5 mAh g-1 at 0.1C and retains 647.2 mAh g-1 after 600 cycles, with a low capacity decay of 0.08% per cycle and show excellent cycling stability The strong confinement of S in the N-doped micropores leads to the electrochemical and thermal stabilisation of S, providing different redox environments. The facile and reversible redox kinetics of the S@n-hC are confirmed by deriving the lowest exchange current density and redox charge-transfer resistance from Tafel and Nyquist plots as well as by the prominent cyclic voltammetry and galvanostatic charge/discharge profiles.