High-performance 2D Siloxene-based Cathode for Lithium-Sulfur Batteries

강희주, 전영시†, 김진영, 조은하, 김예은, 박혜진
전남대학교
(ysjun@jnu.ac.kr†)

Lithium-Sulfur Batteries (LSBs) are considered one of the most promising battery technologies for electric vehicles and energy storage systems. Herein, we propose siloxene-based additive materials for LSBs. Reactive extraction technique using HCl was used in order to drive their two-dimensional (2D) layered structures (2D Siloxene) from CaSi2. Being utilized as cathode-additive materials, 2D Siloxene was able to physically absorb lithium-polysulfides using abundant hydroxyl surface functional groups and increase the tortuosity of the cathode, preventing lithium-polysulfides dissolution. These two effects were thoroughly unveiled by XRD, XPS, and EM. LSBs employing 2D Siloxene (4 mg/cm2) achieved a high areal capacity of ~7 mAh/cm2 with a 10 mg/cm2 sulfur loading corresponding to 53% sulfur-utilization efficiency after 120 cycle at 0.1 C.