

Novel Poreless Inorganic membrane for Blocking Polysulfide Shuttle Effect in Lithium Sulfur Battery

조진일¹, 공용준¹, 유가영¹, 표선미¹, 유지영¹, 김연상^{1,2,†}

¹서울대학교; ²차세대융합기술연구원

(younskim@snu.ac.kr[†])

Lithium sulfur batteries have a high theoretical energy density (~2,600Wh/kg) which is about 7 times higher than that of the current lithium ion batteries. Additionally, the elemental sulfur is low cost materials and abundant resources. However, there are some problems to address that dissolution of polysulfide, and safety issue of the lithium metal anode. In this study, we developed polymer coated inorganic separator (PAAO) to blocking polysulfide shuttle effect and to control lithium metal interface. Anodic aluminum oxide (AAO) evenly distributes the Li ion flux, so proposed separator effectively prevents the ununiformed growth of lithium. It is also mechanically, chemically, and thermally stable and PAAO has less tortuosity than conventional separator. The vertical aligned pores are filled with poly(vinylidene fluoride-co-hexafluoropropene) (PVdF-HFP) to effectively prevent the dissolution of polysulfide. Prepared PAAO showed high specific capacity, high coulombic efficiency, and long cycle life. Compared with a commercial polyethylene separator, PAAO separator shows a better thermal stability, and good electrochemical performance.