Metal-organic framework(MOF) based hybrid separator for Li-S batteries

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Shuttle effect of lithium polysulfide causes the loss of active sulfur and it results in the decrease of the electrochemical performances in lithium-sulfur(Li-S) batteries. Substantial amount of research effort has been devoted to prevent shuttle effect and enhance the performances. Here, we present a simple strategy of mitigating the movement of lithium polysulfide using metal-organic framework(MOF)-Nafion based hybrid battery separator. Negatively charged -SO3 group in MOF repulses the polysulfide and selectively allows the Li ion passage. This functionalized group also help to improve the ionic conductivity along with Nafion matrix. MOF-Nafion based hybrid separator half cell with sulfur containing carbon anode and Li metal cathode exhibit a low capacity decay (0.17% per cycle within 100 cycles) and almost no capacity fading after the initial 10 cycles.