Achieving Fast charge and Stable Lithium-Sulfur Batteries

Lithium sulfur battery (LSB) has been considered as a promising candidate for next-generation energy storage systems, due to its high theoretical specific capacity (1675mAh/g). However, the poor cycling life hinders in its commercial production. The short cycling life results from continuous loss of active material in the form of lithium polysulfide's during a typical charging and discharging process, commonly known as shuttling phenomenon. In this presentation, I will discuss our unique approach of dual (physical, chemical) interaction mechanism based on EG/C coated separator to stop the lithium polysulfide shuttle. The light weight EG/C coated separator ($0.13 mgcm^{-2}$) can extend the cycling life of LSB to 3000 cycles at 1C-rate (1C= 1675mA/g) as shown in the figure below; reducing the decay rate to 0.02% per cycle which is among the best reported up to date. Live in-situ electrochemical discharging results shows that the modified separator works effectively in curbing the polysulfide shuttle.

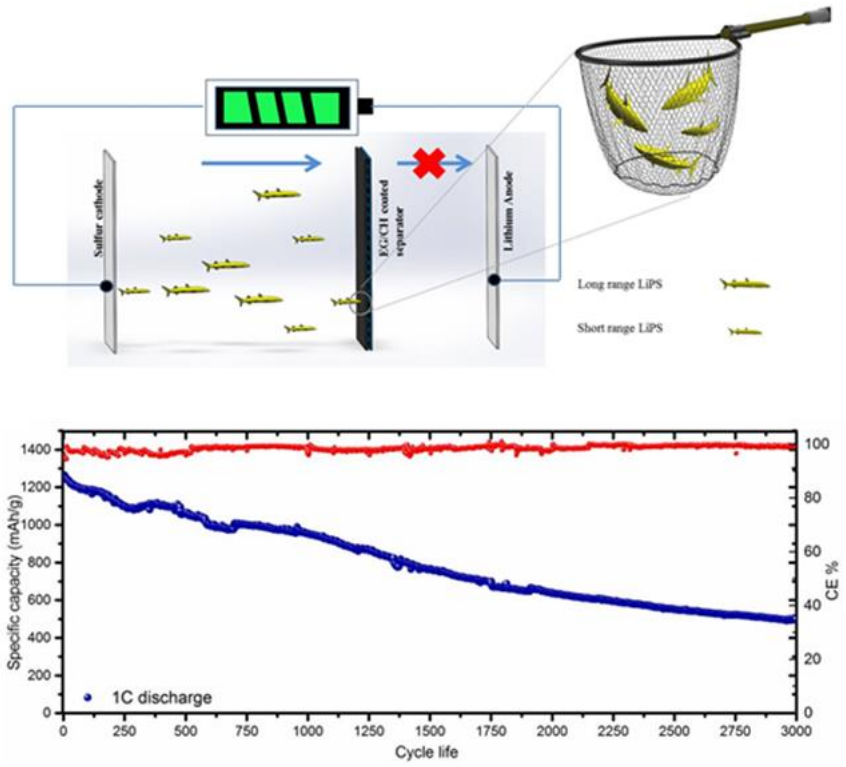

Figure Schematic mechanism of Li-S cell employing modified separator, (b) Long-term cycling performance of Li-S cell using modified separator at current density of 1C.