

The stability of gel polymer electrolyte in liquid Li-S battery

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Gel polymer electrolyte (GPE) and composite gel polymer electrolyte (CGPE) have been widely employed to improve the safety and cycling performance of lithium-ion battery. In view of the fact that the most suitable electrolyte for the Li-S batteries are ether-based solvents instead of ester-based solvents used for lithium-ion batteries, to determine whether the common GPE is applicable to Li-S battery is extremely necessary. The stability of GPE in the ether electrolyte and on the cycling and storage performances of Li-S batteries is examined by testing the solubility of the PEO membrane, PVDF membrane and P(VDF-HFP) membrane in ether electrolyte and detecting the differences of PVDF membrane and P(VDF-HFP) membrane after cycling and storage as the separators of Li-S batteries. Results show that the PEO membrane soaked by ether electrolyte dissolves immediately (Fig.1) and PVDF membrane and P(VDF-HFP) membrane can be insoluble in ether electrolyte (Fig.1) but turn black after cycling and storage as the separators of Li-S batteries (Fig.2). Therefore, the PEO, PVDF and P(VDF-HFP) can not be stable in liquid Li-S battery.

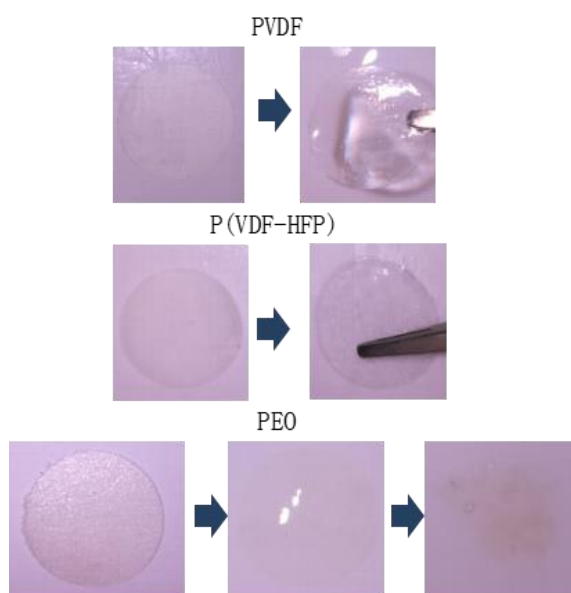


Fig.1 Solubility of GPE membrane in ether electrolyte

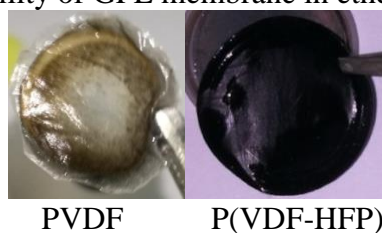


Fig.2 Photos of PVDF membrane and P(VDF-HFP) membrane after storage for 72h as the separators of Li-S batteries