FLUORINATED REDUCED GRAPHENE OXIDE AND ITS APPLICATION IN Li-S BATTERIES

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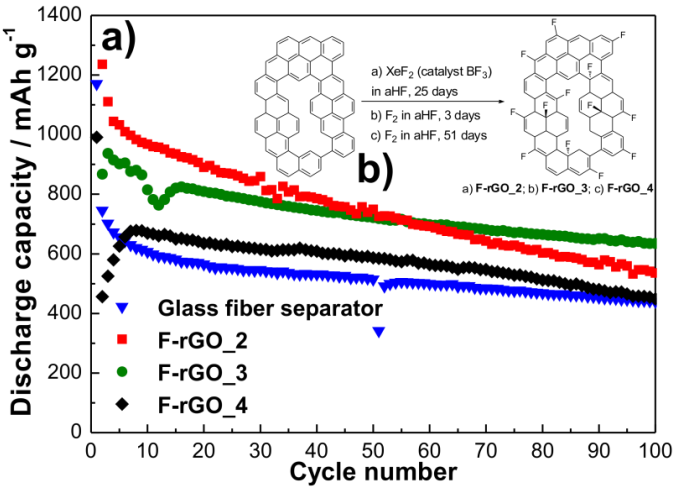
Li-S batteries are expected to be the first post Li-ion battery technology in the commercial use. Their drawback is mainly connected with a capacity degradation, which involves a complicated reaction mechanism with different soluble lithium poylsulfides [1]. Among different strategies to stabilize the capacity degradation, the possible solution is a use of an ion-selective membrane or an interlayer [2] that can limit or stop the polysulfide diffusion/migration towards the anode side. Graphene and its derivatives are due to their properties, materials of the future electronic and energy storage applications and they can be used for an enhancement of electronic conductivity or as an insulating layer. We prepared separator interlayers based on fluorinated reduced graphene oxide (F-rGO). Formation of C–F bonds was confirmed by HAADF-STEM and solid-state NMR measurements. The introduced hydrophobic interlayer improved the cycling stability of the battery, compared to only glass fiber separator. X-ray Photoelectron Spectroscopy (XPS) studies have shown a direct effect on the amount of Li_2S and polysulfides found on the surface of lithium electrode, and demonstrated a better reversibility of reduction/oxidation mechanisms of sulfur at the cathode upon discharge/charge.



Discharge capacity of the fluorinated rGO interlayers (F-rGO_2, F-rGO_3 and F-rGO_4) and glass fiber separator (a) and reaction scheme of the rGO fluorination (b)

References:

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[2] A. Vizintin, M.U.M. Patel, B. Genorio, R. Dominko ChemElectroChem. 1 (2014) 1040–1045.