

F-rGO as an interface between lithium and electrolyte

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Abstract

Metallic lithium is an attractive anode material due to very high energy density. In the combination with high-voltage or high-capacity cathodes, we can obtain batteries with energy density higher compared to the current state of the art of Li-ion batteries. But due to its unstable solid electrolyte interface (SEI), which results in constant lithium and electrolyte consumption caused by formation of fresh SEI and due to lithium dendritic growth during deposition, lithium metal is not widely used as an anode material in Li-ion cells. Here we present the electrochemical performance of F-rGO interlayer on the metallic lithium surface, tested in lithium symmetrical cells combined with two different types of electrolytes. The function of F-rGO on the metallic lithium is twofold: a) it is an electronic insulator and ionic conductor and b) it effectively suppresses formation of high surface area lithium. An enhanced electrochemical stability in two different electrolytes and with two different types of cathodes indicate a potential application in future secondary Li-metal batteries.

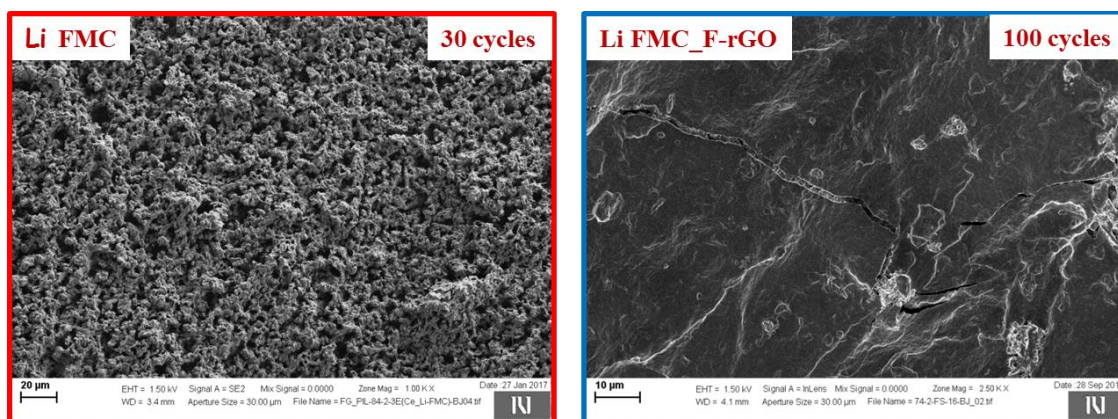


Figure 1: SEM micrograph of lithium surface after cycling. Left: bare lithium surface after 30 stripping and deposition cycles and right: lithium surface covered by F-rGO after 100 stripping and deposition cycles. Current density used in the experiment was $0.5\text{mA}/\text{cm}^2$ for 2h.

References:

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