# Facile Synthesis of $MoS_2$/RGO Composite in Supercritical Ethanol and Electrochemical Reversible Storage of Li-ion batteries

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Two-dimensional MoS2 shows great potential for effective Li storage due to its good thermal and chemical stability, high theoretical capacity, and experimental accessibility. However, MoS2 based electrodes still possess several issues such as fast capacity fading due to its intrinsically poor electrical/ionic conductivity and severe destruction caused by repetitive lithium insertion. In order to solve problems, we introduced reduced graphene oxides (RGO) to the intercalation-exfoliation preparation process of few-layered MoS2 and obtained layer-by-layer MoS2/RGO. MoS2/RGO composite exhibited highly enhanced cyclic stability and high-rate performances as LIB anodes in comparison with bulk MoS2. MoO2/RGO composite was synthesized using a supercritical ethanol route at a very short reaction time of 10 min. Two dimensional (2D) layered MoS2/RGO composites were synthesized through a sulfidation reaction in H2S flow using MoO2/RGO composites as the precursors. The cycling performance of MoS2/RGO composite was higher than bulk MoS2 (116 mAh g-1) after 50 cycle. The MoS2/RGO composite delivered the large reversible capacity (896 mAh g-1) at 50 mA g-1 with negligible capacity fading.