Nitrogen and Sulfur doped Graphene as Efficient Electrocatalyst for Lithium Air Batteries

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Lithium air batteries (Li-air batteries) are advanced energy storage and conversion devices, which realize the reversible transport between chemical energy and electric energy by the electrochemical reaction between chemical reactants lithium (as anode) and oxygen (as cathode) [1-2]. Li-air batteries have ultrahigh theoretical specific energy (11140 Wh·kg⁻¹ excluding oxygen and 3505 Wh·kg⁻¹ if oxygen included) [3-4]. Therefore, they have attracted the widespread concern of electric vehicle industry and the relevant researchers. However, they are still at the initial stage of development since many problems to be solved prior to the practical application, such as low specific energy, low round-trip efficiency, poor cycling life and rate capability [5-6]. An efficient and stable cathode catalyst is one of most promising strategies to improve the performance of Li-air batteries [7].

In this work, nitrogen and sulfur doped graphene were synthesized with new strategy and used as the efficient electrocatalysts for cathode of Li-air batteries. In addition, cyclic voltammetry and rotating disk electrode (RDE) measurements were also conducted to demonstrate the kinetic mechanism of ORR/OER in aqueous and organic electrolytes. Many physicochemical techniques, such as TEM, AFM, XPS, Raman and FTIR, were employed to understand the catalytic performance of these catalysts.

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References