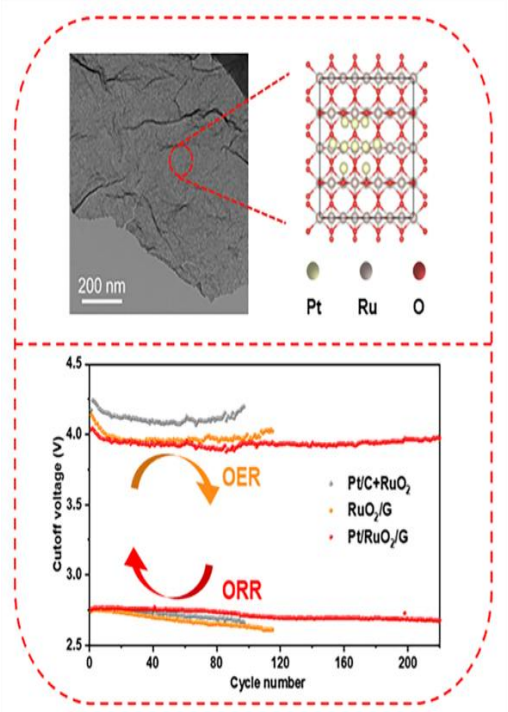
Bifunctional Oxygen Catalyst for Lithium-oxygen Batteries

New Progress

"Recently, a team of researcher Wu Zhongshuai from the Research Group on Chemistry and Energy Applications of 2D Materials (Group 508) of the State Key Laboratory of Catalytic Fundamentals at the Dalian Institute of Chemical Physics, Chinese Academy of Sciences (DICP), in collaboration with the team of academician Bao Xinhe, has made a new progress in the development of highly efficient and stable bifunctional oxygen catalysts by utilizing the spatial domain-limiting effect to integrate on the surface of graphene advanced oxygen reduction (ORR) catalysts, Pt, and oxygen precipitation (OER) catalyst RuO (Pt/RuO2/G) on the graphene surface, successfully realizing excellent OER/ORR and lithium-oxygen battery performance.

Lithium-oxygen batteries have attracted much attention due to their sustainability, environmental friendliness and ultra-high theoretical energy density of up to 3500 Wh kg-1. However, lithium-oxygen batteries still face challenging bottlenecks such as suboptimal overpotential, poor multiplication capability, and limited recyclability, and their commercialization is limited. Therefore, exploring bifunctional oxygen catalysts with high activity, stability and commercializability is the key to enhance the performance of lithium-oxygen batteries.



And it is of great significance to rationally construct bifunctional catalysts targeting different active sites and synergistically improve the OER/ORR of lithium-oxygen batteries.

In this work, the team developed a two-dimensional porous Pt/RuO2/G bifunctional electrocatalyst with remarkable activity and durability, and obtained Pt/RuO2/G with excellent bifunctional oxygen catalytic activity and an OER/ORR potential difference ΔE of only 0.633 V. The lithium-oxygen batteries constructed with it as an anode catalyst achieved more than 220 cycles (more than 2200 h) of Cycling performance.