A Flexible of Macroporous Pd@C Composite Air Electrode for High-Energy Nonaqueous Lithium Oxygen Batteries
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Recently, Li-O₂ batteries have attracted a considerable amount of interest as an alternative energy storage system for the next generation electrical energy storage, since they possess a much higher theoretical specific energy density (3505 Wh·kg⁻¹) [1]. Although important progress has been made by many authors, significant challenges remain. Two significant challenges of Li-O₂ battery are gap between the charge and discharge voltage and reversible cycle life [2].

To resolve this problems, the air electrode structure and the electrocatalysts play important roles. Here, a flexible of Macroporous Ketjen black and Metal Pd (Pd@C) composite air cathode is reported, in which the Pd can act as efficient electrocatalysts, and the macroporous Ketjen black can provide space for Li₂O₂ to deposit and also promote the electron transfer. The electrochemical results on the Pd@C composite air electrode show a 0.81V lower charging plateau and a 0.08 V higher discharging plateau than those of pure Ketjen blank air electrode, with a discharge capacity of nearly 5500mAh·g⁻¹(composite) under a current density of 0.1 mA/cm² during the initial discharge. Excellent cycling performance that more than 50 cycles with capacity limited to 1000 mAh·g⁻¹), reversible capability efficiecy are 100%. Therefore, this hybrid material is a promising candidate for use as a high energy, long-cycle-life, and low-cost cathode material for lithium oxygen batteries.

![Figure 1](image_url)

Figure 1. Schematic of the nanostructured cathode architecture. This figure shows the the palladium nanoparticles and the nanocrystalline lithium peroxide, all of which contribute to lowering the overpotential.

![Figure 2](image_url)

Figure 2. (a) Comparison of the first discharge–charge curves of the Ketjen black, MnO₂/C, NiO/C, and Pd/C at 0.1 mA·cm⁻², with a capacity limited to 1000 mAh g⁻¹ (b) Comparison of the cycling performances of Pd@C macroporous electrode.

References: