Nitrogen-doped Porous Carbon Derived from Chitin with Enhanced Performances for Oxygen Reduction Reaction and Supercapacitor

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doi: 10.20964/2018.06.67

Received: 17 February 2018 / Accepted: 10 April 2018 / Published: 10 May 2018

Herein a porous carbon with a high content of nitrogen, high surface area and high degree of graphitization was prepared by pyrolysing a cheap and abundant biopolymer chitin in the presence of both FeCl₃ and ZnCl₂. It was found the electrochemical performance is significantly dependent on the carbonization temperature. The 1000 °C-treated carbon exhibited high electrocatalytic activity as catalysts for oxygen reduction reaction (ORR), showing a four-electron oxygen reduction pathway with an onset potential of 0.978 V (against reversible hydrogen electrode, RHE). The porous carbon also exhibited a capacitance of 130 F/g at 0.5A/g and excellent rate performance as electrode for supercapacitors. These results are attributed to the high surface area, as well as the high degree of graphitization which endows the as-prepared carbon with a high electrical conductivity.

Keywords: Biomass, porous carbon, chitin, oxygen reduction reaction, supercapacitor

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