Short Communication

Preparation of High Contents of Pyridinic and Pyrrolic-Nitrogen Doped Activated-Carbon from Pyrolysis of Purple Cabbage for the Catalysis of Oxygen Reduction Reaction

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Effective conversion of reproducible organic biomass into valuable carbon material is very important for renewable energy technology. In this study, here we develop a unique strategy to design a nitrogen-doped carbon-based electrocatalyst for oxygen reduction reaction (ORR) *via* successful pyrolysis of purple cabbage combining with ZnCl₂ activation and acid-leaching processes. It is found that this carbon material show high ORR catalysis performance with an ORR onset potential of ~0.96 V *versus* RHE and a half-wave potential of ~0.8 V, slightly lower than that of the commercial Pt/C catalyst in 0.1 mol l⁻¹ KOH solution. The high ORR activity mainly derives from high contents of pyridinic- and pyrrolic-nitrogen inside the prepared carbon material. Besides, compared to the Pt/C catalyst, the prepared catalyst also exhibits excellent long-term stability, which can be considered as a promising carbon-based ORR catalyst for fuel cells.

Keywords: biomass material, oxygen reduction, porous carbon, electrocatalyst

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