

N-doped Porous Carbon Network with Multidirectional Structure as Highly Efficient Metal-Free Catalysts for Oxygen Reduction Reaction

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Metal-free catalysts have gained a lot of attention as a promising candidate to replacing the expensive platinum (Pt) catalysts for oxygen reduction reaction (ORR) which is a key process in low temperature fuel cells. However, development of highly efficient and mass-producible catalysts remains to be great challenges. In this study, N-doped porous carbon (NCA) materials were synthesized by using D-gluconic acid sodium salt, pyrrole, Triton X-100 and KOH. These obtained catalysts exhibit multidirectional porous carbon network structure with abundant graphitic N. Electrochemical tests show that the NCA has high ORR activity in an alkaline condition through four electron pathway for complete reduction of oxygen in water. More importantly, this NCA catalyst is superior to the commercial Pt/C in terms of long-term durability and methanol tolerance.