Microporous N-doped Carbon Electrochemical Catalyst Derived from Polyacrylamide Hydrogel for Oxygen Reduction Reaction in Alkaline Media

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In this work, a series of nitrogen-doped microporous carbon materials with varying N/C ratios have been synthesized by direct carbonization of polyacrylamide hydrogel. The N/C atomic ratios can be accommodated by regulating the amount of urea during the preparation of the hydrogel, and the final microporous structures are obtained after KOH activation. These materials present high oxygen reduction reaction (ORR) activities in alkaline electrolytes, and the ORR performance of such materials is highly dependent on the N/C atomic ratio of precursors. Among these catalysts, the sample labeled PAM-N-0.41 displayed better ORR catalytic performance and stability than commercial Pt/C catalysts. The excellent ORR performance of PAM-N-0.41 can be attributed to its high specific surface area and large numbers of exposed active sites derived from the doping of nitrogen.

Keywords: oxygen reduction reaction; electrochemical catalyst; microporous nitrogen-doped carbon; polyacrylamide hydrogel

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