Effect of post-treatment to the Co-based non-precious metal oxygen reduction catalysts

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Abstract: Polymer electrolyte membrane fuel cell (PEMFC) is an electrochemical device which converts chemical energy into electricity directly without combustion reaction mode. Oxygen reduction reaction (ORR) is a critical process in fuel cell because of its sluggish reaction kinetics and high price of Pt. Many efforts have been focused on synthesizing catalysts with high catalytic activity and reducing the amount of Pt or even non-Pt catalysts. Herein, we report the synthesis of the Co-based nitrogen doped carbon black with post-treatment by acid or alkaline. The post-treatment methods involve thermal treatment, acid and alkaline leaching treatment. Cyclic voltammetry and rotating ring disk electrode techniques are applied to investigate the electrochemical performance and the oxygen reduction catalytic selectivity of the catalysts with different treatments. Research has shown that the post-treatment to the nitrogen-doping Co-based carbon black can greatly influence the ORR activity in both acid and alkaline electrolytes.

Keywords: Oxygen reduction reaction; Post-treatment; Nitrogen doping; Co-based catalyst;