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# Copper-1, 3, 5-benzenetricarboxylate framework nanocrystals on polyaniline: fabrication, characteristics, and electrochemical application for oxygen reduction reaction

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## Abstract

In this work, we fabricated copper-1, 3, 5-benzenetricarboxylate framework nanocrystals on polyaniline (nano-Cu-BTCs/PANI) composites via a Layer-by-Layer (LbL) method. By increasing the number of LbL cycles, size and amount of the nano-Cu-BTCs in the composites were increased. The composite with more amounts of nano-Cu-BTCs exhibited larger surface areas and more increased electrical resistivity. The composites were investigated as electrocatalysts for oxygen reduction reaction (ORR) in 0.1 M KOH. Among the nano-Cu-BTCs( $x$  wt%)/PANI ( $x = 8.2, 12, 20, \text{ and } 37$ ) composites, the composite with 12 wt% of Cu-BTC nanocrystals showed the best electrocatalytic activity for ORR, which would be mainly associated with destabilization of a  $\text{OH}_2^-$  intermediate, resulting in a further reduction reaction of the intermediate to  $\text{OH}^-$  in the alkaline solution.

## 1. Introduction

Development of economical electrocatalyst materials is a critical goal for commercial progress toward a fuel cell[1, 2]. Pt-based materials are considered to be typical electrocatalysts for the oxygen reduction reaction (ORR), which is the cathode

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