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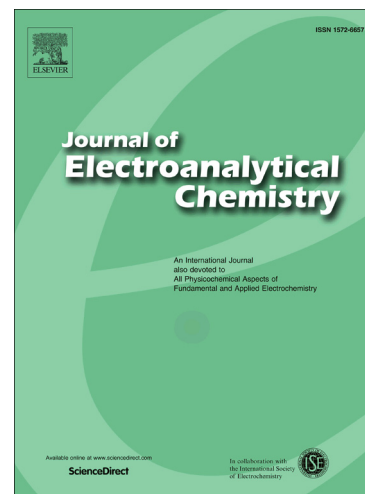
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Graphitic Carbon Nitrides Supported by Nitrogen-Doped Graphene as Efficient Metal-Free Electrocatalysts for Oxygen Reduction

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Abstract:

Owing to its low cost and rich nitrogen content, graphitic carbon nitride (g-C₃N₄) is promising metal-free catalyst for oxygen reduction reaction (ORR). However, the electrocatalytic performance of carbon nitride is limited by its low conductivity. In order to circumvent this limitation, we incorporated g-C₃N₄ with nitrogen-doped graphene (N-G) by ball-milling g-C₃N₄ and N-G to produce g-C₃N₄@N-G of an ORR catalytic activity comparable to the commercial Pt/C catalyst, along with a better long-term stability and more tolerance to the methanol crossover effect.

Keywords: carbon nitride, graphene, metal-free catalyst, oxygen reduction, ball milling

1. Introduction

Instead of burning fossil fuels, fuel cells can convert chemical energy directly into electricity by reducing oxygen gas at cathode and oxidizing hydrogen gas at anode with water as the only by-product and free from pollution. Due to the slow kinetics of the oxygen reduction reaction (ORR), catalysts are required for ORR. Platinum (Pt) has been known to be the best electrocatalyst for the cathodic oxygen reduction. However, commercial Pt/C catalysts are still

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