

## **One-Pot Facile Synthesis of N-Doped Graphene Synthesized from Paraphenylenediamine as Metal-Free Catalysts for the Oxygen Reduction Used for Alkaline Fuel Cells**

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**Abstract :** In the work presented here, nitrogen-doped graphene materials were synthesized and used as metal-free electrocatalysts for oxygen reduction reaction (ORR) under alkaline conditions. Paraphenylenediamine was used as N precursor. The N-doped graphene was synthesized under hydrothermal treatment at 200°C. All the materials have been characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Transmission electron microscopy (TEM) and X-ray photo-electron spectroscopy (XPS). Moreover, for electrochemical evaluation of samples, Rotating Disk electrode (RDE) and Cyclic Voltammetry techniques (CV) were employed. The resulting material exhibits an outstanding catalytic activity for the oxygen reduction reaction (ORR) as well as excellent resistance towards methanol crossover effects, indicating their promising potential as ORR electrocatalysts for alkaline fuel cells.

**Keywords :** alkaline fuel cell, graphene, metal-free catalyst, paraphenylen diamine

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