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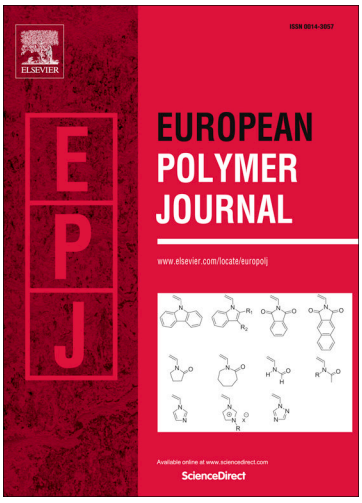

Boron-Nitrogen-Phosphorous Doped Graphene Nanoplatelets for Enhanced Electrocatalytic Activity

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Boron-Nitrogen-Phosphorous Doped Graphene Nanoplatelets for Enhanced Electrocatalytic Activity

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Abstract. Doping with foreign atoms is a powerful technique for modifying the inherent properties of a host materials. In this work, we report a strategy for preparing multiple heteroatom-doped graphene nanoplatelets (GnPs). Poly(anilineboronic acid, PABA), which is one of the conducting polymers, was *in-situ* grafted to edge-amine functionalized GnPs (A-GnPs) in phosphoric acid. The isolated PABA grafted A-GnPs phosphoric acid salts (PA-GnP salts) were heat-treated at 900 °C under argon atmosphere to yield boron (B)-nitrogen (N)-phosphorus (P) doped GnPs (BNP-GnPs). The structure of the BNP-GnPs was confirmed by various techniques, including transmission electron microscopy, scanning electronic microscopy, X-ray photoelectron spectroscopy, Raman spectroscopy and thermogravimetric analysis. The BNP-GnPs demonstrated significantly improved electrocatalytic activity towards the oxygen reduction reaction, suggesting that BNP-GnPs can be one of the best alternatives to precious Pt-based electrocatalysts.

KEYWORDS: Poly(anilineboronic acid); Graphene nanoplatelets; Doping; Electrocatalyst; Oxygen reduction reaction