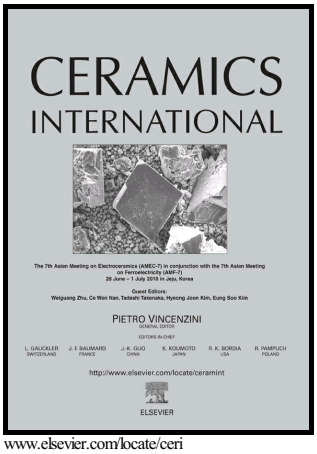

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Hexagonal Boron Nitride nanosheets exfoliated by Sodium Hypochlorite Ball Mill and their Potential Application in Catalysis

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Abstract:

The unique physicochemical properties of two-dimensional (2D) *h*-BN and its promising applications in future optoelectronics have motivated an extensive study of its properties. However, a major limiting factor is its high quality and scalable preparation of few-layer *h*-BN. Herein, a facile, low cost, and high yield process is developed by using a sodium hypochlorite aqueous solution-assisted ball milling exfoliation process. The facile process results in scalable production of few-layer (2~4 sheets) *h*-BN from commercial BN powders，with little damage of its in-plane structure and high yield amounting to 21%. Furthermore, few-layer *h*-BN has been demonstrated to be good carrier to support and disperse Ag nanoparticles with high catalytic activity for the reduction of *p*-nitrophenol to *p*-aminophenol with $NaBH_4$. The pseudo-first-order reaction rate constant of the pre-prepared catalyst was calculated to be $7.13\times10^{-3}s^{-1}$, larger than that of pristine BN supported Ag nanoparticles. The results indicate that stable exfoliation process could open the way to a range of important applications of *h*-BN based materials.

Key Words: Boron nitride nanosheets; ball milling; hypochlorite; catalytic

1. Introduction

Two-dimensional (2D) materials have attracted much recent attention, due to their high specific surface area, novel electronic structure and distinctive physicochemical properties that differ from their bulk, low dimensionality counterparts [1-3]. Especially, those 2D nanosheets with molecular thickness have potential application in the field of high-speed electronic [4], optical devices [5], energy generation and storage [6-7], chemical sensors [8] and photoelectric conversion [9]. Hexagonal boron nitride (*h*-BN), is also one 2D material named white graphene[10], which has recently been reported potential applications in the field of superhydrophobic coatings, transparent composites, ultraviolet-light emitters, thin supports for high-resolution imaging of nanocrystals, high-temperature oxidation-resistant coatings, etc. Due to its favorable mechanical and thermal