

# Accepted Manuscript

RGO-wrapped Ni-P hollow octahedrons as noble-metal-free catalysts to boost the hydrolysis of ammonia borane toward hydrogen generation

Rongzun Zhang, Jinlong Zheng, Tingwen Chen, Guanshui Ma, Wei Zhou



PII: S0925-8388(18)32098-X

DOI: [10.1016/j.jallcom.2018.05.354](https://doi.org/10.1016/j.jallcom.2018.05.354)

Reference: JALCOM 46330

To appear in: *Journal of Alloys and Compounds*

Received Date: 14 March 2018

Revised Date: 28 May 2018

Accepted Date: 30 May 2018

Please cite this article as: R. Zhang, J. Zheng, T. Chen, G. Ma, W. Zhou, RGO-wrapped Ni-P hollow octahedrons as noble-metal-free catalysts to boost the hydrolysis of ammonia borane toward hydrogen generation, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.05.354.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# RGO-wrapped Ni-P hollow octahedrons as noble-metal-free catalysts to boost the hydrolysis of ammonia borane toward hydrogen generation

Rongzun Zhang, Jinlong Zheng\*, Tingwen Chen, Guanshui Ma, Wei Zhou\*

*School of Chemistry, Beihang University, Beijing, 100191, China*

## ABSTRACT

Ni-P hollow octahedrons wrapped by reduced graphene oxide (Ni-P H-Oct-rGO) were prepared by phosphorization of the rGO wrapped NiS<sub>2</sub> solid octahedrons (NiS<sub>2</sub> S-Oct-rGO) precursor. The shell thickness of Ni-P hollow octahedrons was ~20 nm. As a catalyst for the hydrolysis of ammonia borane (AB), the Ni-P H-Oct-rGO exhibits the turnover frequency (TOF) and the activation energy ( $E_a$ ) of  $34.2 \pm 0.6 \text{ mol}_{\text{H}_2} \text{ mol}_{\text{Ni-P}}^{-1} \text{ min}^{-1}$  and  $40.8 \text{ kJ mol}^{-1}$  under ambient conditions, respectively. This work provides a simple synthetic method to obtain a high activity non-noble metal catalyst for the hydrolytic dehydrogenation of AB. The high surface area of Ni-P hollow octahedron with more active sites, the synergistic effect and interfacial interaction between Ni-P NPs and rGO, and the component and structural stability of Ni-P ensure that the Ni-P H-Oct-rGO present excellent activity and re-usability for the hydrolysis of AB. The as-prepared Ni-P H-Oct-rGO is an ideal candidate with superior catalytic performance and satisfied durable stability towards generating hydrogen, which is an important fuel in practical applications.

**Keywords:** Hollow octahedron, Reduced graphene oxide, Hydrogen, Ammonia borane

## 1. Introduction

Hydrogen, as the most promising carrier for clean and renewable energy, has attracted increasing attentions to solve environmental and energy issues[1-3]. But the low density of hydrogen makes it difficult to store and transfer in the liquid state, which limits its development[4, 5]. Various new materials have been developed to overcome these hurdles,

---

\* Corresponding author:

*E-mail address:* zhengjinlong@buaa.edu.cn, zhouwei@buaa.edu.cn

Download English Version:

<https://daneshyari.com/en/article/7990871>

Download Persian Version:

<https://daneshyari.com/article/7990871>

[Daneshyari.com](https://daneshyari.com)