

Accepted Manuscript

Electrochemical prepared phosphorene as a cathode for supercapacitors

Lei Zu, Xing Gao, Huiqin Lian, Ce Li, Qian Liang, Yongri Liang, Xuemei Cui, Yang Liu, Xiaodong Wang, Xiuguo Cui



PII: S0925-8388(18)32766-X

DOI: [10.1016/j.jallcom.2018.07.265](https://doi.org/10.1016/j.jallcom.2018.07.265)

Reference: JALCOM 46981

To appear in: *Journal of Alloys and Compounds*

Received Date: 25 May 2018

Revised Date: 22 July 2018

Accepted Date: 24 July 2018

Please cite this article as: L. Zu, X. Gao, H. Lian, C. Li, Q. Liang, Y. Liang, X. Cui, Y. Liu, X. Wang, X. Cui, Electrochemical prepared phosphorene as a cathode for supercapacitors, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.07.265.

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.

Electrochemical prepared phosphorene as a cathode for supercapacitors

Lei Zu^a, Xing Gao^{a,b}, Huiqin Lian^{a,*}, Ce Li^{a,b}, Qian Liang^{a,b}, Yongri Liang^a, Xuemei Cui^b, Yang Liu^a, Xiaodong Wang^b, Xiuguo Cui^{a,*}

^a Beijing Key Lab of Special Elastomer Composite Materials, College of Materials Science and Engineering, Beijing Institute of Petrochemical Technology, Beijing 102617, P.R.China

^b State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing 100029, P.R. China

* corresponding author: lianhuiqin@bipt.edu.cn; cuixiuguo@bipt.edu.cn;

ABSTRACT

As a new member of 2D materials, the phosphorene possesses many unique characteristics compared with other carbon-based materials, which is strongly correlated to the structure and the electronic properties of phosphorus, can enable its use in electrochemical energy storage devices. Herein, we present a simpler approach to prepare phosphorene and then use it as an electrode in a new supercapacitor, which has a battery performance but works via the redox reaction of iodide ions on the interface of phosphorene electrode and electrolyte. The phosphorene is prepared by an electrochemical cathodic exfoliation method and the exfoliation mechanism is discussed. The high-quality phosphorene can be obtained within 5 minutes without ultrasonication and the yield is ~93.1%. The dimension of phosphorene reaches micrometer grade. By virtue of the merit of the great electrocatalysis effect of phosphorene to iodide ions, the specific discharge capacity reaches to 3181.5 F/g in a three-electrode system and the largest specific energy density is 203.7 Wh/kg in an asymmetric hybrid system.

Keywords Black phosphorus, Phosphorene, Electrochemical cathodic exfoliation, Iodide ions, Supercapacitors

Download English Version:

<https://daneshyari.com/en/article/8943247>

Download Persian Version:

<https://daneshyari.com/article/8943247>

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