

Accepted Manuscript

Alkali-Assisted Mild Aqueous Exfoliation for Single-layered and Structure-preserved Graphitic Carbon Nitride Nanosheets

Gengnan Li, Liang Li, Haiyang Yuan, Haifeng Wang, Huarong Zeng, Jianlin Shi

PII: S0021-9797(17)30143-1

DOI: <http://dx.doi.org/10.1016/j.jcis.2017.01.112>

Reference: YJCIS 22018

To appear in: *Journal of Colloid and Interface Science*

Received Date: 8 January 2017

Revised Date: 26 January 2017

Accepted Date: 29 January 2017

Please cite this article as: G. Li, L. Li, H. Yuan, H. Wang, H. Zeng, J. Shi, Alkali-Assisted Mild Aqueous Exfoliation for Single-layered and Structure-preserved Graphitic Carbon Nitride Nanosheets, *Journal of Colloid and Interface Science* (2017), doi: <http://dx.doi.org/10.1016/j.jcis.2017.01.112>

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.



Alkali-Assisted Mild Aqueous Exfoliation for Single-layered and Structure-preserved Graphitic Carbon Nitride Nanosheets

Gengnan Li,^a Liang Li,^{a*} Haiyang Yuan,^b Haifeng Wang,^b Huarong Zeng,^c Jianlin Shi^{a,d*}

^a Key Laboratory for Ultrafine Materials of Ministry of Education, School of Materials Science and Engineering, East China University of Science and Technology, Shanghai 200237, China

^b State Key Laboratory of Chemical Engineering Center for Computational Chemistry and Research Institute of Industrial Catalysis, East China University of Science and Technology, Shanghai 200237, China

^c Information Materials and Devices Research Center, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China

^d State Key Laboratory of High Performance Ceramic and Superfine Microstructure, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China

Email: liliang@ecust.edu.cn; jlshi@mail.sic.ac.cn; Tel: +86-21-64252599; Fax: +86-21-64250740

Key Words: Nanosheets; Exfoliation; Graphitic Carbon Nitride; Alkali Solution

Abstract: Single-layered g-C₃N₄ nanosheets have been fabricated by delaminating directly its bulk counterpart in an alkaline solution. According to the theoretical modeling, the interaction of OH⁻ with terminal -NH₂ or bridged -NH- group of the triazine units within bulk g-C₃N₄ crystal structure could result in decreased bonding energy between layers and promote the total delamination. The resulting g-C₃N₄ nanosheets colloid has a relatively high concentration (12 g/L) compared with the traditional ultrasonic assistant exfoliation method. The delaminated nanosheets are revealed by atomic force microscopy to show a lateral size of a hundred nanometers and a thickness of about 0.4 nm, which provides a direct evidence for the total exfoliation of g-C₃N₄ crystals into their single sheets. More importantly, the X-ray diffraction measurement confirms that the g-C₃N₄ nanosheets could be re-assembled with well-preserved original crystal structure. The exfoliation mechanism was also confirmed by the DFT calculation.

Download English Version:

<https://daneshyari.com/en/article/4984877>

Download Persian Version:

<https://daneshyari.com/article/4984877>

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