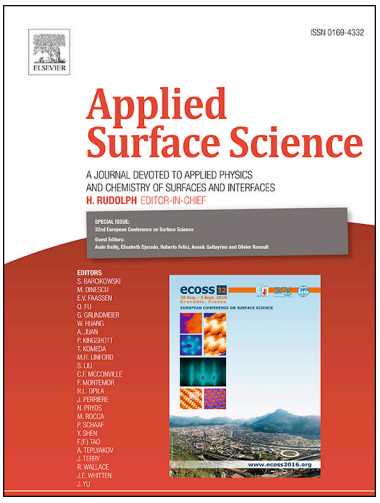
Accepted Manuscript



Full Length Article

B / N co-doped Carbon Derived from the Sustainable Chitin for C-H Bond Oxidation

Yunrui Zhang, Hong Zhang, Yinuo Zhao, Xingyan Han, Haijun Wang, Yongjun Gao

PII: S0169-4332(18)31826-9
DOI: https://doi.org/10.1016/j.apsusc.2018.06.258
Reference: APSUSC 39766

To appear in: *Applied Surface Science*

Received Date: 13 April 2018
Revised Date: 26 June 2018
Accepted Date: 27 June 2018

Please cite this article as: Y. Zhang, H. Zhang, Y. Zhao, X. Han, H. Wang, Y. Gao, B / N co-doped Carbon Derived from the Sustainable Chitin for C-H Bond Oxidation, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.06.258

B / N co-doped Carbon Derived from the Sustainable Chitin for C-H Bond Oxidation

Yunrui Zhang, Hong Zhang, Yinuo Zhao, Xingyan Han, Haijun Wang, Yongjun Gao *

Key Laboratory of Medicinal Chemistry and Molecular Diagnosis of Ministry of Education, College of Chemistry and Environmental Science, Hebei University, Baoding 071002, China.

Abstract: Boron and nitrogen co-doped carbon materials were synthesized by using sustainable chitin as precursor and boric acid as recyclable template. The carbon product possessing high surface area (1100 ~1400 m^2/g) and micro- and mesoporous structure exhibited excellent catalytic activity in the oxidation of benzylic C-H bond of ethylbenzene. Characterizations demonstrate that there are boron nitride (BN) bonds in carbon product achieved at higher calcining temperature. Experimental results and density functional theory (DFT) calculations suggested that the boron nitride domains locating in the carbocatalyst were essential to its catalytic activity. B dopants could anchor active oxygen-containing groups and then transfer oxygen atoms to substrate during the whole catalytic process.

1. Introduction

The selective oxidation of C-H bond in hydrocarbon, particularly in saturated hydrocarbon, is significant in the chemical industry [1, 2] . This process could directly achieve value-added chemicals such as alcohol, aldehyde, ketone and carboxylic acid from hydrocarbon. Generally, noble or transition metal catalysts were usually used to catalyze the oxidation reaction and oxygen or air was used as oxidant [3] . However, the immobilized transition metal atoms may leach into the reactant system, which may increase the cost of product purification. Therefore, it is of importance to develop a cheap and environmental-friendly catalytic system to replace the currently used metal catalysts.

Recently, carbocatalyst accompanied with suitable oxidant such as hydrogen peroxide, tert-butyl hydroperoxide and even air, present a potential application in the mild C-H bond oxidation [4, 5] .

* Corresponding author. Tel: 86-312-5079357. E-mail: yjgao@hbu.edu.cn