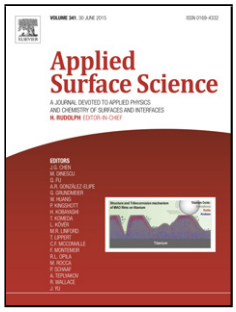

Title: Towards the atomic-scale characterization of isolated iron sites confined in a nitrogen-doped graphene matrix

Authors: Qingfei Liu, Yun Liu, Haobo Li, Lulu Li, Dehui Deng, Fan Yang, Xinhe Bao

PII: S0169-4332(17)30749-3
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2017.03.090
Reference: APSUSC 35466

To appear in: *APSUSC*

Received date: 16-2-2017
Revised date: 8-3-2017
Accepted date: 9-3-2017

Please cite this article as: Qingfei Liu, Yun Liu, Haobo Li, Lulu Li, Dehui Deng, Fan Yang, Xinhe Bao, Towards the atomic-scale characterization of isolated iron sites confined in a nitrogen-doped graphene matrix, Applied Surface Science http://dx.doi.org/10.1016/j.apsusc.2017.03.090

Towards the atomic-scale characterization of isolated iron sites confined in a nitrogen-doped graphene matrix

Qingfei Liu,[a, b] Yun Liu,[a, b] Haobo Li,[a, b] Lulu Li,[c] Dehui Deng,[a] Fan Yang,[a] Xinhe Bao*[a]*

[a]*State Key Laboratory of Catalysis, CAS Center for Excellence in Nanoscience, Dalian National Laboratory for Clean Energy, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, 116023, China*
[b]*University of Chinese Academy of Sciences, Beijing, 100039, China*
[c]*College of Chemistry, Faculty of Chemical, Environmental and Biological Science and Technology, Dalian University of Technology, Dalian, 116023, China*

***Corresponding authors**: fyang@dicp.ac.cn; xhbao@dicp.ac.cn*

Highlights

- Local atomic and electronic structure of the Fe-N-C catalyst characterized by STM and STS.
- The combination of air-AFM, UHV-STM and DFT calculations for the characterization of powder catalysts.
- The selection of solvent is vital to the homogeneous dispersion of powder catalyst on a planar support.

Abstract

Atomic scale characterization of the surface structure of powder catalysts is essential to the identification of active sites, but remains a major challenge in catalysis research. We described here a procedure that combines atomic force microscopy (AFM), operated in air, and scanning tunneling microscopy (STM), operated in UHV, to obtain the atomic structure and local electronic properties of powder catalysts. The atomically dispersed Fe-N-C catalyst was used as an example, which was synthesized by low temperature ball milling methods. We discussed the effect of solvents in the dispersion