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Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Graphene Nanofilms Functionalized with Electroactive Nanoparticles and Enzyme for Electrocatalytic Sensing

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Graphene has been a miracle material of intensive interest in many fields ranging from physics to biology in the past decade. Wet-chemical methods offer low-cost production and facile functionalization of single-layered and solution suspended graphene nanosheets, which can be transformed into *free-standing* graphene papers (or nanofilms).[1] In this communication, we present a systematic study on the preparation and functional tests of functionalized reduced graphene oxide (RGO) nanofilms (or papers) for electrocatalysis based chemical- and biosensing.[2] Water soluble *Prussian blue* nanoparticles (PBNPs) were synthesized and doped on RGO nanosheets which were filtrated further into graphene papers. RGO-PBNPs papers show highly efficient electrocatalysis towards reduction of hydrogen peroxide and can be used alone as *flexible* chemical sensors for potential applications in detection of hydrogen peroxide or/and other organic peroxides. The as-prepared PBNPs-RGO papers are also capable of biocompatible accommodation of enzymes for development of free-standing biosensors.

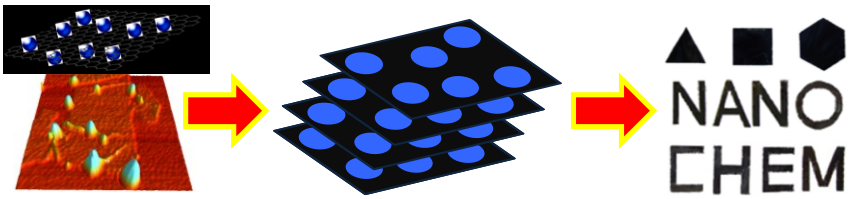

Figure 1. Schematic diagram, AFM image and digital picture of RGO-PBNP sheets and paper: high-resolution 3D AFM image of PBNPs doped RGO nanosheet (left), schematic illustration of RGO-PBNPs nanosheets transformed into *free-standing* paper (middle), and digital photo of various patterns obtained by cutting graphene papers (right).

References

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[2] N. Zhu, S. Han, S. Gan, J. Ulstrup, Q. Chi, *Adv. Funct. Mater.* **2013**, *23*, 5297-5306.

Acknowledgements
This work was supported by the Danish Research for Technology and Product Science (Project No. 12-127447). S. Han and R.S.D. acknowledge the Hans C. Ørsted Postdoc Fellowships rewarded by Technical University of Denmark.