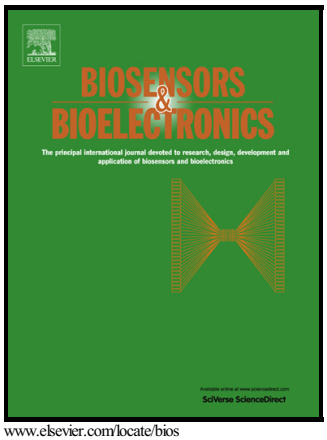
Electrochemical biosensing platform based on Amino acid Ionic liquid functionalized graphene for ultrasensitive biosensing applications

Xianbo Lu, Xue Wang, Jing Jin, Qing Zhang, Jiping Chen



www.elsevier.com/locate/bios

PII: S0956-5663(14)00449-7
DOI: http://dx.doi.org/10.1016/j.bios.2014.06.036
Reference: BIOS6870

To appear in: *Biosensors and Bioelectronic*

Received date: 8 April 2014
Revised date: 5 June 2014
Accepted date: 10 June 2014

Cite this article as: Xianbo Lu, Xue Wang, Jing Jin, Qing Zhang and Jiping Chen, Electrochemical biosensing platform based on Amino acid Ionic liquid functionalized graphene for ultrasensitive biosensing applications, *Biosensors and Bioelectronic,* http://dx.doi.org/10.1016/j.bios.2014.06.036

Electrochemical biosensing platform based on amino acid ionic liquid functionalized graphene for ultrasensitive biosensing applications

Xianbo Lu[*], *Xue Wang, Jing Jin, Qing Zhang, Jiping Chen*[*]

Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, 116023, China.

ABSTRACT

In this study, a facile non-covalent method was developed for preparing water-soluble graphene with excellent electronic conductivity. Room temperature ionic liquids (ILs) with high ionic conductivity were used for the non-covalent surface functionalization of graphene through π– π stacking interactions. Compared to other ILs used, amino acid ionic liquids (AAILs) were found to be the most effective for improving the dispersion of graphene in water phase. Electrochemical and spectroscopic results confirmed that the obtained AAIL functionalized GR can retain the excellent electronic conductivity of pristine graphene without damaging the graphene lattice. The obtained water-soluble graphene (GR-AAIL) was exemplified to fabricate an electrochemical biosensor using tyrosinase as a model enzyme, and the sensitivity (12600 mA cm^{-2} M^{-1}) of GR-AAIL based biosensor was about 17 times higher than that of graphene oxide and other nanomaterial based biosensor, displaying its unprecedented high sensitivity for

[*] Corresponding author. Tel/Fax: 86-411-84379562; E-mail: xianbolu@dicp.ac.cn, chenjp@dicp.ac.cn.