

ONE-POT SYNTHESIS OF NITROGEN-DOPED REDUCED GRAPHENE OXIDE AS THE EFFICIENT ELECTROCHEMICALLY MODIFIED ELECTRODE MATERIAL FOR Hg(II) DETECTION

Z-G. Wu¹, C-C. Bi², X. Chen² and S.V.R. Weerasooriya^{1,3*}

¹*Department of Environmental Science, University of Peradeniya, Peradeniya, Sri Lanka*

²*Institute of Industry and Equipment Technology, Hefei University of Technology, Hefei, PR China*

³*National Institute of Fundamental Studies, Kandy, Sri Lanka*

**rohanw@pdn.ac.lk*

Nitrogen-doped reduced graphene oxide (N-rGO) was synthesized by one-pot facile hydrothermal method for electrochemical detection of trace Hg(II). In this research, urea, a nitrogen-rich material, was used to dope N in graphene oxide. Comparing to graphene, the N-rGO modified glassy carbon electrode exhibits excellent electrochemical response towards Hg(II) with sensitivity of 19.38 $\mu\text{A } \mu\text{M}^{-1}$ and limit of detection (LOD) of 9.29 nM (3σ method). The coordination of N-rGO and Hg(II) was confirmed by X-ray photoelectron spectroscopy and density function theory (DFT) calculation results. Additionally, the anti-interference test of related cations was also studied. Hence, the approach in this work provides a novel method for intrinsically regulating carbon materials, which could be used as advanced electrodes in the field of electrochemical detection.

Financial assistance from the National Research Council, Sri Lanka (Grant No. 16-015) and National Natural Science Foundation of China (Grant No. 21777164) is acknowledged.

Keywords: DFT calculation, Electrochemical detection, Hg(II), Hydrothermal, Nitrogen-doped reduced graphene oxide