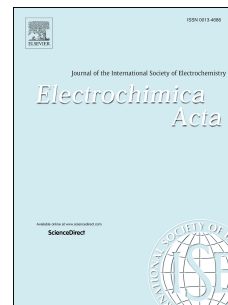


# Accepted Manuscript

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PII: S0013-4686(18)31785-7

DOI: [10.1016/j.electacta.2018.08.017](https://doi.org/10.1016/j.electacta.2018.08.017)

Reference: EA 32451

To appear in: *Electrochimica Acta*

Received Date: 21 May 2018

Revised Date: 24 July 2018

Accepted Date: 5 August 2018

Please cite this article as: B.J. Matsoso, B.K. Mutuma, C. Billing, K. Ranganathan, T. Lerotholi, G. Jones, N.J. Coville, The effect of N-configurations on selective detection of dopamine in the presence of uric and ascorbic acids using surfactant-free N-graphene modified ITO electrodes, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.08.017.

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## The effect of N-configurations on selective detection of dopamine in the presence of uric and ascorbic acids using surfactant-free N-graphene modified ITO electrodes

Boitumelo J Matsoso<sup>a, b, c</sup>, Bridget K Mutuma<sup>a, b, d</sup>, Caren Billing<sup>b</sup>, Kamalakannan Ranganathan<sup>a, b, e</sup>, Tsenolo Lerotholi<sup>b</sup>, Glenn Jones<sup>f</sup> and Neil J Coville<sup>a, b\*</sup>

<sup>a</sup> DST-NRF Centre of Excellence in Strong Materials and <sup>b</sup> Molecular Sciences Institute, School of Chemistry, University of the Witwatersrand, 2050, Johannesburg, South Africa

<sup>c</sup> Laboratoire des Multimatériaux et Interfaces, UMR 5615 CNRS, Université Claude Bernard Lyon 1, F-69622 Villeurbanne Cedex-France <sup>#</sup>

<sup>d</sup> Department of Physics, University of Pretoria, Hatfield, Pretoria, South Africa <sup>#</sup>

<sup>e</sup> School of Electrical Engineering, Faculty of Engineering, Tel Aviv University, Tel Aviv, Israel <sup>#</sup>

<sup>f</sup> Johnson Matthey Technology Center, Blount's Court, Sonning Common, Reading, RG4 9NH, UK

### Abstract

Nitrogen doped graphene based electrodes are increasingly gaining attention for application in voltammetric detection of dopamine (DA). However, little attention has been paid on the influence of the relative concentration of N-configurations on the electrocatalytic performance of these electrodes. Therefore in this study, sensitive and selective surfactant-free indium tin oxide (ITO) electrodes, modified with N-graphene films of varying nitrogen configurations, were employed for detection of DA in the presence of uric (UA) and ascorbic acids (AA). The N-graphene films, initially characterized using XPS, consisted of 38-60% pyridinic-N, 4-31% pyrrolic-N, 13-56% graphitic-N, and 2-9% oxidised pyridinic-N (NO<sub>x</sub>). The results showed that the NGr/ITO electrodes exhibited excellent selective electrocatalytic performance for the oxidation of DA in the presence of UA and AA. As a result, the detection limits (S/N = 3) of DA were determined to be  $0.131 \pm 0.005 \mu\text{M}$ ,  $0.153 \pm 0.03 \mu\text{M}$ , and  $0.645 \pm 0.07 \mu\text{M}$  at the NGr-2/ITO, NGr-10/ITO and NGr-20/ITO electrodes, respectively. The excellent electrocatalytic activity of NGr-2/ITO electrode towards the oxidation of DA was ascribed mainly to an improved  $\pi$ - $\pi$  interaction of the NO<sub>x</sub> (9.2%) and pyrrolic N-configurations (59.6%) with the hydroxyl and amine groups on DA. Generally, this study has provided a procedure for designing new surfactant-free 2D N-graphene based electrochemical sensors with specific electrocatalytic performance.

\*Corresponding author: Fax: 27 +11 717 6749; E-mail address: [neil.coville@wits.ac.za](mailto:neil.coville@wits.ac.za) (Neil Coville), <sup>#</sup> Current address.

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