

Electrochemical bio-sensors based on 2D materials.

Giulio Maccaferri,^{a,b} Chiara Zanardi,^a Zhen Yuan Xia,^b Alessandro Kovtun,^b Andrea Liscio,^b Fabio Terzi,^a Vincenzo Palermo,^b Renato Seeber^{a,b}

^a Department of Chemical and Geological Sciences, Università di Modena e Reggio Emilia, Via G. Campi 103, 41125 Modena, Italia.

^b Istituto di Sintesi organica e Fotoreattività (ISOF), Consiglio Nazionale della Ricerca (CNR), via Gobetti 101 - 40129 Bologna, Italia.

g.maccaferri@gmail.com

We describe the use of thin coatings of graphene oxide (GO) for the electrochemical detection of benchmark analytes, namely β -nicotinamide adenine dinucleotide (NADH) and ascorbic acid (AA). The response of GO nanosheets to these chemical species is maximized by tuning the oxidation grade of the coating by an in-situ electrochemical pre-treatment. The electrocatalytic performance of GO modified electrodes, significantly better than standard carbon-based electrodes, is correlated to the surface chemistry of the electrodes, defined by X-ray photoelectron spectroscopy (XPS). Similar electrocatalytic performance is also achieved by directly depositing electrochemically exfoliated graphene oxide (EGO)¹, with no need of any pre-treatment steps. The advantages in the use of these materials for electrochemical sensing, as well as for fundamental studies of GO properties, are discussed.

- [1] Z.Y. Xia, G. Giambastiani, C. Christodoulou, M.V. Nardi, N. Koch, E. Treossi, V. Bellani, S. Pezzini, F. Corticelli, V. Morandi, A. Zanelli, and V. Palermo, Synergic Exfoliation of Graphene with Organic Molecules and Inorganic Ions for the Electrochemical Production of Flexible Electrodes. *ChemPlusChem*, (2014) 79, 439.

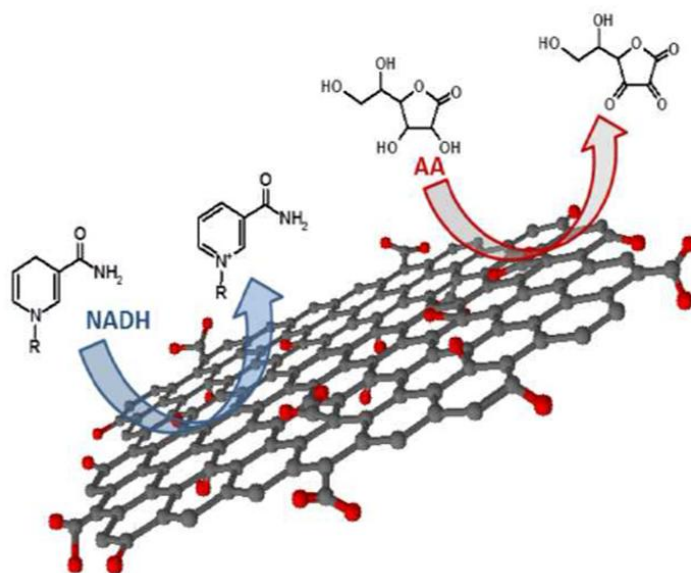


Figure: Interaction of graphene with nicotinamide adenine dinucleotide (NADH) and ascorbic acid (AA).

References