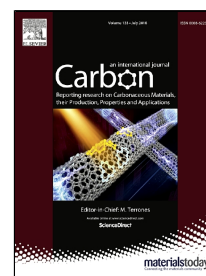


Accepted Manuscript

Design strategy of a graphene based bio-sensor for glucose

Valentina Cantatore, Santosh Pandit, V.R.S.S. Mokkaapati, Severin Schindler, Siegfried Eigler, Ivan Mijakovic, Itai Panas



PII: S0008-6223(18)30504-9
DOI: 10.1016/j.carbon.2018.05.044
Reference: CARBON 13171
To appear in: *Carbon*
Received Date: 16 January 2018
Accepted Date: 22 May 2018

Please cite this article as: Valentina Cantatore, Santosh Pandit, V.R.S.S. Mokkaapati, Severin Schindler, Siegfried Eigler, Ivan Mijakovic, Itai Panas, Design strategy of a graphene based bio-sensor for glucose, *Carbon* (2018), doi: 10.1016/j.carbon.2018.05.044

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Design strategy of a graphene based bio-sensor for glucose

Valentina Cantatore^{1,2*}, Santosh Pandit³, V. R. S. Mokkalapati³, Severin Schindler¹, Siegfried Eigler⁴,
Ivan Mijakovic^{3,5}, Itai Panas¹

¹ Department of Chemistry and Chemical Engineering, Chalmers University of Technology,
Kemivägen 10, 41296 Gothenburg, Sweden

² Department of Material Science, Università di Milano-Bicocca, Via Cozzi 55, 20125 Milan,
Italy

³ Department of Biology and Biological Engineering, Chalmers University of Technology,
Kemivägen 10, 41296 Gothenburg, Sweden

⁴ Institute of Chemistry and Pharmacy, Freie Universität Berlin, Takustrasse 3, 14195 Berlin,
Germany

⁵ Novo Nordisk Foundation Center for Biosustainability, Technical University of Denmark,
2800 Kgs. Lyngby, Denmark

Corresponding Author

*E-mail: valcan@chalmers.se (Valentina Cantatore)

Abstract

A novel graphene-based glucose sensor-design is formulated and explored *in silico*. An *ad hoc* host molecule is tailored to bind to glucose by multiple hydrogen bonds. A pyridinic core is chosen for this receptor in order to allow for “socket-plug” dative bonding to boron sites of boron doped graphene. The modeling employs DFT (Density Functional Theory) together with an effective aqueous environment to take into account the solvation effect. High selectivity is demonstrated for the suggested host molecule towards glucose as compared to other possible competitors in blood such as fructose, biotin and ascorbic acid. A route to achieve improved sensitivity, exploiting the hydrophilic/hydrophobic properties of the host+glucose system for enhanced selective binding to the hydrophobic boron doped graphene support is discussed.

Download English Version:

<https://daneshyari.com/en/article/7847554>

Download Persian Version:

<https://daneshyari.com/article/7847554>

[Daneshyari.com](https://daneshyari.com)