

Title: Membrane Selectivity versus Sensor Response in Hydrogenated Amorphous Silicon CHEMFETs Using a Semi-Empirical Model

Author(s): Costa, J.^{1,2}; Fernandes, M.^{1,2}; Vieira, M.^{1,2}; Lavareda, G.²; Karmali, A.³

Source: Journal of Nanoscience and Nanotechnology

Volume: 11 **Issue:** 10 **Pages:** 8844-8847 **DOI:** 10.1166/jnn.2011.3493 **Published:** Oct 2011

Document Type: Article

Language: English

Abstract: Toxic amides, such as acrylamide, are potentially harmful to Human health, so there is great interest in the fabrication of compact and economical devices to measure their concentration in food products and effluents. The CHEMICALLY Modified Field Effect Transistor (CHEMFET) based on amorphous silicon technology is a candidate for this type of application due to its low fabrication cost. In this article we have used a semi-empirical model of the device to predict its performance in a solution of interfering ions. The actual semiconductor unit of the sensor was fabricated by the PECVD technique in the top gate configuration. The CHEMFET simulation was performed based on the experimental current voltage curves of the semiconductor unit and on an empirical model of the polymeric membrane. Results presented here are useful for selection and design of CHEMFET membranes and provide an idea of the limitations of the amorphous CHEMFET device. In addition to the economical advantage, the small size of this prototype means it is appropriate for in situ operation and integration in a sensor array.

Author Keywords: Amorphous; Silicon; Membrane; Selectivity; Ammonium

KeyWords Plus: Field-Effect Transistors; ISFET

Reprint Address: Costa, J (reprint author), ISEL, Elect Telecommun & Comp Dept, P-1959007 Lisbon, Portugal.

Addresses:

1. ISEL, Elect Telecommun & Comp Dept, P-1959007 Lisbon, Portugal
2. CTS UNINOVA FCT, P-2829516 Monte De Caparica, Portugal
3. ISEL, Chem Engn & Biotechnol Res Ctr, P-1959007 Lisbon, Portugal

Publisher: Amer Scientific Publishers

Publisher Address: 26650 The Old Rd, STE 208, Valencia, CA 91381-0751 USA

ISSN: 1533-4880

Citation: COSTA, J.; FERNANDES, M.; VIEIRA, M.; LAVAREDA, G.; KARMALI, A. - Membrane Selectivity versus Sensor Response in Hydrogenated Amorphous Silicon CHEMFETs Using a Semi-Empirical Model. Journal of Nanoscience and Nanotechnology. ISSN 1533-4880. Vol. 11, n. 10 (2011) p. 8844-8847.