Title: Use of a-SiC:H Semiconductor-Based Transducer for Glucose Sensing through FRET Analysis

Author(s): **Louro, Paula** [1]; **Silva, Vítor** [1]; **Vieira, Manuel A.** [1]; **Karmali, A.**; **Vieira, Manuela** [1]

Source: Technological Innovation for the Internet of Things **Book Series:** IFIP Advances in Information and Communication Technology **Volume:** 394 **Pages:** 631-638 **Published:** 2013

Conference: 4th IFIP WG 5.5/SOCOLNET Doctoral Conference on Computing, Electrical and Industrial Systems, DoCEIS 2013 **Location:** Costa da Caparica, Portugal **Date:** Apr 15-17, 2013 **Sponsor(s):** SOCOLNET; Int Federat Informat Process; IEEE Ind Elect Soc

Document Type: Proceedings Paper

Language: English

Abstract: Glucose sensing is an issue with great interest in medical and biological applications. One possible approach to glucose detection takes advantage of measuring changes in fluorescence resonance energy transfer (FRET) between a fluorescent donor and an acceptor within a protein which undergoes glucose-induced changes in conformation. This demands the detection of fluorescent signals in the visible spectrum. In this paper we analyzed the emission spectrum obtained from fluorescent labels attached to a protein which changes its conformation in the presence of glucose using a commercial spectrofluorometer. Different glucose nanosensors were used to measure the output spectra with fluorescent signals located at the cyan and yellow bands of the spectrum. A new device is presented based on multilayered a-SiC:H heterostructures to detect identical transient visible signals. The transducer consists of a p-i'(a-SiC:H)-n/p-i(a-Si:H)-n heterostructure optimized for the detection of the fluorescence resonance energy transfer between fluorophores with excitation in the violet (400 nm) and emissions in the cyan (470 nm) and yellow (588 nm) range of the spectrum. Results show that the device photocurrent signal measured under reverse bias and using appropriate steady state optical bias, allows the separate detection of the cyan and yellow fluorescence signals presented.

Author Keywords: Glucose sensing; FRET; Nanosensors; Fluorescence proteins; a-SiC:H photodiodes; Multilayered heterostructures; Optical sensors

Reprint Address: Louro, P (reprint author) - ISEL, Elect Telecommun & Comp Dept, Lisbon, Portugal

Addresses:
[1] ISEL, Elect Telecommun & Comp Dept, Lisbon, Portugal

Publisher: Springer-Verlag Berlin
Publisher Address: Heidelberger Platz 3, D-14197 Berlin, Germany

ISSN: 1868-4238
ISBN: 978-3-642-37290-2

Citation: LOURO, Paula; SILVA, Vítor; VIEIRA, Manuel A.; KARMALI, A.; VIEIRA, Manuela - Use of a-SiC:H Semiconductor-Based Transducer for Glucose Sensing through FRET Analysis. Technological Innovation for the Internet of Things. ISSN 1868-4238. ISBN 978-642-37290-2. Vol. 394 (2013), p. 631-638.