**Title:** Detection of Change in Fluorescence Between Reactive Cyan and the Yellow Fluorophores Using a-SiC:H Multilayer Transducers

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**Source:** Plasmonics **Volume:** 8 **Issue:** 1 **Pages:** 139-142
**DOI:** 10.1007/s11468-012-9441-6 **Published:** Mar 2013

**Conference:** Spring Meeting of the European-Materials-Research-Society (E-MRS)/Symposium N/ Symposium
**Location:** Strasbourg, France **Date:** May 14-18, 2012
**Sponsor(s):** European Mat Res Soc (E-MRS)

**Document Type:** Proceedings Paper

**Language:** English

**Abstract:** The transducer consists of a semiconductor device based on two stacked -i-n heterostructures that were designed to detect the emissions of the fluorescence resonance energy transfer between fluorophores in the cyan (470 nm) and yellow (588 nm) range of the spectrum. This research represents a preliminary study on the use of such wavelength-sensitive devices as photodetectors for this kind of application. The device was characterized through optoelectronic measurements concerning spectral response measurements under different electrical and optical biasing conditions. To simulate the fluorescence resonance energy transfer (FRET) pairs, a chromatic time-dependent combination of cyan and yellow wavelengths was applied to the device. The generated photocurrent was measured under reverse and forward bias to read out the output photocurrent signal. A different wavelength-biasing light was also superimposed. Results show that under reverse bias, the photocurrent signal presents four separate levels, each one assigned to the different wavelength combinations of the FRET pairs. If a blue background is superimposed, the yellow channel is enhanced and the cyan suppressed, while under red irradiation, the opposite behavior occurs. So, under suitable biasing light, the transducer is able to detect separately the cyan and yellow fluorescence pairs. An electrical model, supported by a numerical simulation, supports the transduction mechanism of the device.

**Author Keywords:** Optical sensors; Semiconductors; Photodiodes

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**Publisher:** Springer
**Publisher Address:** 233 Spring ST, New York, NY 10013 USA

**ISSN:** 1557-1955

**Citation**: LOURO, P.; SILVA, V.; VIEIRA, M. A.; VIEIRA, M. - Detection of Change in Fluorescence Between Reactive Cyan and the Yellow Fluorophores Using a-SiC:H Multilayer Transducers. Plasmonics. ISSN 1557-1955. Vol. 8, nr 1 (2013), p. 139-142.