

Accepted Manuscript

Title: Novel high-performance SOI junctionless FET-based phototransistor using channel doping engineering: numerical investigation and sensitivity analysis

Authors: H. Ferhati, F. Djeffal

PII: S0030-4026(17)30337-6
DOI: <http://dx.doi.org/doi:10.1016/j.ijleo.2017.03.071>
Reference: IJLEO 58994

To appear in:

Received date: 17-12-2016
Accepted date: 17-3-2017

Please cite this article as: H.Ferhati, F.Djefal, Novel high-performance SOI junctionless FET-based phototransistor using channel doping engineering: numerical investigation and sensitivity analysis, *Optik - International Journal for Light and Electron Optics* <http://dx.doi.org/10.1016/j.ijleo.2017.03.071>

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.



Novel high-performance SOI junctionless FET-based phototransistor using channel doping engineering: numerical investigation and sensitivity analysis

H. Ferhati¹ and F. Djeflal^{1,2,*}

¹LEA, Department of Electronics, University of Batna 2, Batna 05000, Algeria.

² LEPCM, University of Batna 1, Batna 05000, Algeria.

*E-mail: faycal.djeflal@univ-batna2.dz, faycaldzdz@hotmail.com,

Tel/Fax: 0021333805494

Abstract

In this paper, graded channel doping (*GCD*) and junctionless paradigms are proposed as a new ways to improve the optical controlled field effect transistor (*OCFET*) and bridging the gap between the high responsivity and ultra-low power consumption. A careful mechanism study based on numerical investigation and a performance comparison between the proposed structure and both the conventional inversion mode (*IM-OCFET*) and the junctionless (*JL-OCFET*) designs is presented. It is found that the graded channel doping feature can efficiently improve the overall device optical and electrical performances. Moreover, the proposed design exhibits superior device figures of merit (*FoMs*) and provides ultra-sensitivity behavior as compared to both the conventional *IM-OCFET* and the *JL-OCFET* counterparts. Our investigation reveals also the outstanding capability of the proposed structure for offering the weak signal detection advantage that demonstrates the unique property of our phototransistor with *GCD* aspect. These characteristics not only underline the excellent switching behavior of the proposed design but also demonstrate the ability for overcoming the trade-off between the low cost and readily fabrication process in addition to ultrasensitive aspect with low power consumption. This makes the proposed *GCD-JL-OCFET* a potential alternative for developing low power communication systems.

Key words: Junctionless, *OCFET*, Sensitivity, Communication, Power consumption, low cost.

Download English Version:

<https://daneshyari.com/en/article/5025610>

Download Persian Version:

<https://daneshyari.com/article/5025610>

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