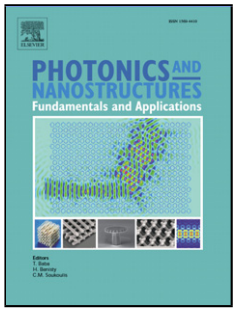
Accepted Manuscript



Title: A High-Sensitivity Sensor Based on Three-Dimensional Metal–Insulator–Metal Racetrack Resonator and Application for Hemoglobin Detection

Authors: Mohammad Reza Rakhshani, Mohammad Ali Mansouri-Birjandi

PII: S1569-4410(18)30009-9
DOI: https://doi.org/10.1016/j.photonics.2018.08.002
Reference: PNFA 675

To appear in: *Photonics and Nanostructures – Fundamentals and Applications*

Received date: 10-1-2018
Revised date: 14-5-2018
Accepted date: 13-8-2018

Please cite this article as: Rakhshani MR, Mansouri-Birjandi MA, A High-Sensitivity Sensor Based on Three-Dimensional Metal–Insulator–Metal Racetrack Resonator and Application for Hemoglobin Detection, *Photonics and Nanostructures - Fundamentals and Applications* (2018), https://doi.org/10.1016/j.photonics.2018.08.002

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.

ACCEPTED MANUSCRIPT

A High-Sensitivity Sensor Based on Three-Dimensional Metal–Insulator–Metal Racetrack Resonator and Application for Hemoglobin Detection

Mohammad Reza Rakhshani[1] and Mohammad Ali Mansouri-Birjandi[2, *]

[1]Faculty of Engineering, University of Zabol, Iran (e-mail: rakhshany@gmail.com).

[2, *]Faculty of Electrical and Computer Engineering, University of Sistan and Baluchestan, P. O. Box 9816745563, Zahedan, Iran (e-mail: mansouri@ece.usb.ac.ir).

Highlights:

- An integrated plasmonic sensor, using an MIM racetrack resonator structure, is designed and analyzed.
- Refractive index and temperature sensitivity can be obtained as high as 4650 nm/RIU and 0.69 nm/°C, respectively.
- The sensing performances are investigated numerically by the FDTD method.
- It can potentially be applicable for biosensing applications such as hemoglobin concentration detection.

Abstract

In this paper, we designed a high-sensitivity plasmonic sensor using three-dimensional plasmonic metal–insulator–metal (MIM) waveguides and a racetrack resonator. By detecting the resonance wavelength, changes in the refractive index of the resonator can be sensed, on the basis of the linear relationship between these two parameters. The structure was numerically simulated by the finite-difference time-domain method (FDTD), and the results show that the refractive index and temperature sensitivity values can be obtained as high as 4650 *nm* per refractive index unit (RIU) and 0.33 *nm*/*°C*, respectively. We show that such improved sensitivity can be obtained by using a long lateral interaction length along the entire flat resonator sidewalls. The effects of radius and refractive index of racetrack resonator are studied from the sensing spectra to evaluate the sensitivity performance, as well. The proposed structure

Download English Version:

https://daneshyari.com/en/article/10141908

Download Persian Version:

https://daneshyari.com/article/10141908

Daneshyari.com