

448

Accession number:WOS:000305719600004

Title:A planar split-ring resonator-based microwave biosensor for label-free detection of biomolecules

Authors:Lee, H. J. (2); Lee, J.H. (6); Moon, H.S. (3); Jang, I.S. (4); Choi, J.S. (4); Yook, J.G. (5); Jung, H.I. (1)

Author affiliation:(1) Yonsei Univ, Natl Core Res Ctr Nanomed Technol, Lab Biochip Technol, Seoul 120749, South Korea; (2) Sejong Univ, Graphene Res Inst, Seoul, South Korea; (3) Samsung Adv Inst Technol, Bio Lab, Emerging Tech R&D Ctr, Suwon, South Korea; (4) Korea Basic Sci Inst, Div Life Sci, Taejon, South Korea; (5) Yonsei Univ, Sch Elect & Elect Engn, Seoul 120749, South Korea; (6) Yonsei Univ, Sch Mech Engn, Seoul 120749, South Korea

Source title:SENSORS AND ACTUATORS B-CHEMICAL

Abbreviated source title:SENSOR ACTUAT B-CHEM

Volume:169

Issue date: JUL 5 2012

Pages:26-31

Language:English

ISSN:0925-4005

Document type:Article

Publisher:ELSEVIER SCIENCE SA, PO BOX 564, 1001 LAUSANNE, SWITZERLAND

Abstract:In this study, a planar split-ring resonator (SRR)-based RF biosensor was developed for label-free detection of biomolecules such as the prostate cancer marker, prostate specific antigen (PSA), and cortisol stress hormone. The biosensor has a resonance-assisted transducer and is excited by a time-varying magnetic field component of a local high-impedance microstrip line. The resulting device exhibits an intrinsic S-21 resonance with a quality-factor (or Q-factor) of 50. For the biomolecular interaction, anti-PSA and anti-cortisol were immobilized on the gold surface of the resonator by a protein-G mediated bioconjugation process and corresponding frequency shifts of $\Delta f(1)(p) = 30 \pm 2$ MHz (for anti-PSA) and $\Delta f(1)(c) = 20 \pm 3$ MHz (for anti-cortisol) were observed. The additional frequency shift of each PSA and cortisol antigen with a 100 pg/ml concentration was about 5 ± 1.5 MHz and 3 ± 1 MHz, respectively. From the experimental results, we confirmed that our device is very effective RF biosensor with a limit of detection (LOD) of 100 pg/ml and has sufficiently feasibility as a label-free biosensing scheme. Crown Copyright (C) 2012 Published by Elsevier B.V. All rights reserved.

Number of references:26

Main heading:Physics

DOI:10.1016/j.snb.2012.01.044