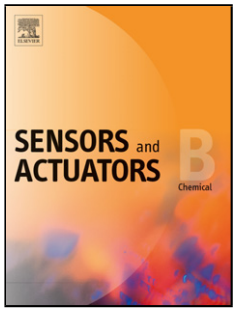
Accepted Manuscript



Title: Drastic sensing enhancement using acoustic bubbles for surface-based microfluidic sensors

Author: A. De Vellis D. Gritsenko Y. Lin Z. Wu X. Zhang Y. Pan W. Xue J. Xu

PII: S0925-4005(16)31896-2
DOI: http://dx.doi.org/doi:10.1016/j.snb.2016.11.098
Reference: SNB 21308

To appear in: *Sensors and Actuators B*

Received date: 5-8-2016
Revised date: 31-10-2016
Accepted date: 21-11-2016

Please cite this article as: A. De Vellis, D. Gritsenko, Y. Lin, Z. Wu, X. Zhang, Y. Pan, W. Xue, J. Xu, Drastic sensing enhancement using acoustic bubbles for surface-based microfluidic sensors, *<![CDATA[Sensors & Actuators: B. Chemical]]>* (2016), http://dx.doi.org/10.1016/j.snb.2016.11.098

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

Drastic Sensing Enhancement Using Acoustic Bubbles For Surface-Based Microfluidic Sensors

A. De Vellis[a,1], D. Gritsenko[a,1], Y. Lin[a], Z. Wu[b], X. Zhang[c], Y. Pan[a], W. Xue[d], J. Xu[a,*]

[a] *Department of Mechanical and Industrial Engineering, University of Illinois, Chicago, IL 60607,USA.*

[b] *School of Science, Beijing University of Posts and Telecommunications,Beijing 100876, China.*

[c] *Department of Mechanical Engineering, Columbia University, New York, NY 10027,USA.*

[d] *Department of Mechanical Engineering, College of Engineering, Rowan University, Glassboro, NJ 08028,USA.*

Abstract

There is a high demand for ultrafast biosensors for industrial and public health applications. However, the performance of existing sensors is often limited by the slow mass transport process in traditional pressure-driven microfluidic devices. In this paper we show for the first time, that acoustic microbubbles trapped in prefabricated cavities in a micro-chamber are capable of enhancing fluid sample mixing that results in faster delivery of target species to the sensor surface. We demonstrate a drastic reduction of sensor response time (up to 21.3 fold) for surface-based nanosenors in presence of resonantly actuated microbubbles. The obtained results are valid in a wide pH (4-10) range and agree well with previous studies.

Keywords: sensing enhancement, microstreaming, microfluidics, resonant frequency

*Corresponding author

Email address: jiexu@uic.edu (J. Xu)

[1]These authors contributed equally to this work.

Accepted Manuscript

Download English Version:

https://daneshyari.com/en/article/5009480

Download Persian Version:

https://daneshyari.com/article/5009480

Daneshyari.com