

Author's Accepted Manuscript

Integration of biosensors into digital microfluidics:
impact of hydrophilic surface of biosensors on
droplet manipulation

Ehsan Samiei, George S. Luka, Hodayoun
Najjaran, Mina Hoorfar



PII: S0956-5663(16)30226-3
DOI: <http://dx.doi.org/10.1016/j.bios.2016.03.035>
Reference: BIOS8546

To appear in: *Biosensors and Bioelectronic*

Received date: 14 January 2016
Revised date: 14 March 2016
Accepted date: 16 March 2016

Cite this article as: Ehsan Samiei, George S. Luka, Hodayoun Najjaran and Mina Hoorfar, Integration of biosensors into digital microfluidics: impact of hydrophilic surface of biosensors on droplet manipulation, *Biosensors and Bioelectronic*, <http://dx.doi.org/10.1016/j.bios.2016.03.035>

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 a review of the resulting galley proof before it is published in its final citable 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.

Integration of biosensors into digital microfluidics: impact of hydrophilic surface of biosensors on droplet manipulation

Ehsan Samiei, George S. Luka, Homayoun Najjaran, and Mina Hoorfar*

University of British Columbia, 3333 University way, Kelowna, BC V1V1V6, Canada

Email address: mina.hoorfar@ubc.ca

*Corresponding author: Mina Hoorfar

Abstract

Several studies have been performed on the integration of biosensors into digital microfluidics (DMF). Despite the general success in their detection capabilities, there are still two challenges associated with the integration of biosensors into DMF: 1) complete removal of the droplet containing the analytes from the sensing surface; and 2) biochemical regeneration of the biosensor involving detaching the target analyte from the receptor after each round of sensing. The latter is case dependent and the solution can vary from one application to another. Our research aims at addressing the former, the solution to which is applicable to all biosensors integrated to DMF. This paper presents a thorough characterization of the hydrophilic surface of the biosensor in terms of wettability and geometry, taking into account the overall configuration of the DMF platform. Consequently, we identify the optimal geometry of the sensing surface and the DMF platform providing successful removal of the target droplet from the sensing surface after detection. Based on the results, the gap height is suggested to be chosen at the upper limit of the applicable range. Also, the biosensor, patterned on the device top plate, is recommended to be designed with a high aspect ratio and aligned with the center of the actuating electrode. As a proof of concept, the optimum configuration is implemented on a DMF platform with an interdigitated capacitive biosensor to detect different concentrations of *Cryptosporidium*, for which it is shown that the sample droplet is removed successfully from the superhydrophilic surface of the biosensor.

Keywords: Digital microfluidics; Biosensor; Hydrophilic surface; Capacitive detection.

Download English Version:

<https://daneshyari.com/en/article/7230695>

Download Persian Version:

<https://daneshyari.com/article/7230695>

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