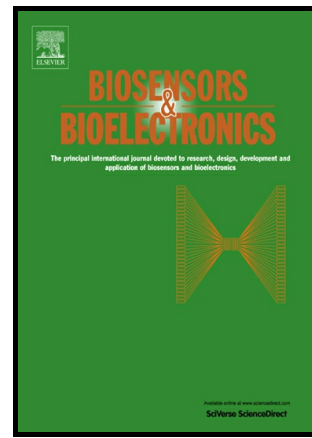


Author's Accepted Manuscript

Multifunctional 3D electrode platform for real-time *in situ* monitoring and stimulation of cardiac tissues

Ning Zhang, Flurin Stauffer, Benjamin R. Simona, Feng Zhang, Zhao-Ming Zhang, Ning-Ping Huang, János Vörös



PII: S0956-5663(18)30297-5
DOI: <https://doi.org/10.1016/j.bios.2018.04.037>
Reference: BIOS10433

To appear in: *Biosensors and Bioelectronic*

Received date: 14 February 2018
Revised date: 9 April 2018
Accepted date: 17 April 2018

Cite this article as: Ning Zhang, Flurin Stauffer, Benjamin R. Simona, Feng Zhang, Zhao-Ming Zhang, Ning-Ping Huang and János Vörös, Multifunctional 3D electrode platform for real-time *in situ* monitoring and stimulation of cardiac tissues, *Biosensors and Bioelectronic*, <https://doi.org/10.1016/j.bios.2018.04.037>

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 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.

Multifunctional 3D electrode platform for real-time *in situ* monitoring and stimulation of cardiac tissues

Ning Zhang^{1,2}, Flurin Stauffer², Benjamin R. Simona³, Feng Zhang¹, Zhao-Ming Zhang¹, Ning-Ping Huang^{1*}, János Vörös^{2**}

¹State Key Laboratory of Bioelectronics, School of Biological Science and Medical Engineering, Southeast University, 210096 Nanjing, China

²Laboratory of Biosensors and Bioelectronics, ETH Zurich, Gloriastrasse 35, 8092 Zurich, Switzerland

³Ectica Technologies AG, Gloriastrasse 35, 8092 Zurich, Switzerland

nphuang@seu.edu.cn

janos.voros@biomed.ee.ethz.ch

*Corresponding author. Prof. Ning-Ping Huang, Southeast University, State Key Laboratory of Bioelectronics, School of Biological Science and Medical Engineering, Si Pai Lou 2#, 210096 Nanjing, Jiangsu, China. Tel: +86 25 83790820; Fax: +86 25 83795635

**Corresponding author. Prof. János Vörös, ETH Zurich, Laboratory of Biosensors and Bioelectronics, Institute for Biomedical Engineering, ETZ F82, Gloriastrasse 35, 8092 Zurich, Switzerland. Tel: +41 44 632 59 03; Fax: +41 44 632 11 93

Abstract

Cardiovascular diseases are a major cause of death around the world underlining the importance of efficient treatments including novel medication. *In vitro* models of cardiac tissues are highly desired for monitoring electrophysiological response to screen pharmaceutical compounds at an early stage. Here, we report a platinum based 3D pillar electrode platform with cell growth guiding channel, which allows integrated, continuous electrical stimulation and recording of the cardiac tissues. This platform was successfully used to culture beating cardiomyocytes over weeks. The Pt-PDMS pillar electrode showed an impedance of 2.5 ± 0.3 k Ω at 10 Hz that is stable for using in cell cultures at 37°C. Electrically pacing the cells improved maturation of the cardiac tissues. Contraction activities of 3D cardiac tissues were monitored in real-time through the pillar electrodes to evaluate physiological parameters. Adding 100 nM Isoproterenol clearly increased the spontaneous beating rate and decreased

Download English Version:

<https://daneshyari.com/en/article/7229285>

Download Persian Version:

<https://daneshyari.com/article/7229285>

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