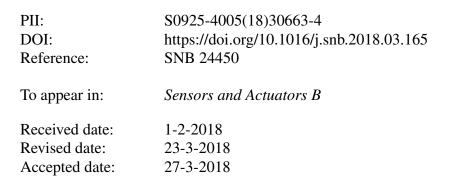
Accepted Manuscript

Title: A "cleanroom-free" and scalable manufacturing technology for the microfluidic generation of lipid-stabilized droplets and cell-sized multisomes

Authors: Tatiana Trantidou, Anna Regoutz, Xian N. Voon, David J. Payne, Oscar Ces



Please cite this article as: Tatiana Trantidou, Anna Regoutz, Xian N.Voon, David J.Payne, Oscar Ces, A "cleanroom-free" and scalable manufacturing technology for the microfluidic generation of lipid-stabilized droplets and cell-sized multisomes, Sensors and Actuators B: Chemical https://doi.org/10.1016/j.snb.2018.03.165

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 "cleanroom-free" and scalable manufacturing technology for the microfluidic generation of lipid-stabilized droplets and cell-sized multisomes

Tatiana Trantidou^{a,*}, Anna Regoutz^b, Xian N. Voon^a, David J. Payne^b, and Oscar Ces^{a,c,*}

^aDepartment of Chemistry, Imperial College London, Exhibition Road, South Kensington, SW7 2AZ, UK ^bDepartment of Materials, Imperial College London, Exhibition Road, South Kensington, SW7 2AZ, UK ^cInstitute of Chemical Biology, Imperial College London, Exhibition Road, South Kensington, SW7 2AZ, UK Email addresses: <u>t.trantidou@imperial.ac.uk</u> (T. Trantidou), <u>o.ces@imperial.ac.uk</u> (O. Ces) Declarations of interest: none.

Highlights

- A cleanroom-free, highly scalable and low-cost microfluidic technology is proposed.
- The technology relies on biocompatible dry film resists and multi-layer lamination.
- The technology is showcased for the production of artificial biomembranes.
- Stable, monodisperse lipid droplets and double emulsions (ø15-200 µm) are produced.
- The technology enables low-cost high-volume fabrication of disposable devices.

Abstract

There is a growing demand to construct artificial biomimetic structures from the bottom-up using simple chemical components in a controlled and high-throughput way. These cell mimics are encapsulated by lipid membranes and can reconstitute biological machinery within them. To date, such synthetic cells based upon droplet microfluidics are fabricated using non-scalable, expensive and time-consuming strategies, and are thus restricted to small-scale in-house manufacturing. Here, we report a "cleanroom-free" and highly scalable microfluidic manufacturing technology based on dry film resists and multilayer lamination. The technology facilitates the controlled and highthroughput generation of stable and monodisperse droplets using anionic surfactants and more biologically relevant phospholipids. We demonstrate the versatility of this approach by selectively patterning the surface chemistry of the device, enabling the production of compartmentalized lipid structures based on droplet interface bilayers (multisomes). This technology has the potential to simultaneously unlock the widespread exploitation of microfluidics to chemists and synthetic biologists not having access to controlled production environments and facilitate low-cost (<f1) high-volume fabrication of self-contained disposable devices with minimum feature sizes of 30 µm. The associated material and equipment costs approach those of other deskilled prototyping technologies, such as 3D printing that have made the transition into the mainstream.

Download English Version:

https://daneshyari.com/en/article/7139666

Download Persian Version:

https://daneshyari.com/article/7139666

Daneshyari.com