DCU INVENT
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Dublin City University
Licensing Opportunity

LIFE SCIENCES

Barrier film based reagent storage and on-demand release technologies

INTRODUCTION

The Fraunhofer Project Centre for Embedded Bioanalytical Systems "FPC@DCU" - an initiative jointly supported by Science Foundation Ireland and Fraunhofer-Gesellschaft - is a one-stop shop for the development of microfluidics-based solutions for automation of bioanalytical testing. With its consequent "Quality-by-Design" approach, platform strategy and capability of seamless scale-up from prototyping to production, FPC@DCU is able to rapidly advance to high technology readiness levels (TRLs), thereby substantially de-risking commercially driven product development.

BACKGROUND

Incorporation of wet reagent storage that enables bioanalytical fluidic operations (e.g.: resuspension of dried or lyophilized reagents using stored buffers in a diagnostic point-of-care device) is a key requirement for low-cost devices that can be deployed in-field without the need of trained user intervention. Current commercial solutions employ sealed pouches or blister packs. Although robust, these methods pose significant issues around cost, ease of manufacturing, integration and deployment due to the inherent complexity of the concepts. The Microsystems & Bio-interfacing Group at FPC@DCU has developed an inexpensive, scalable and embedded barrier film based wet reagent storage technology that also incorporates release of wet reagents on microfluidic platforms especially towards point-of-care devices.

TECHNOLOGY DESCRIPTION

Laboratory based and/or point-of-use automation of bioanalytical and similar fluidic operations requires the ability to store and release wet reagents as and when needed (stored over a period of a greater than 2 months to a year at room temperature, particularly for single-use point-of-care, point -of-need diagnostic devices or for flow control/barrier formation in microfluidics enabled laboratory instruments). Wet reagent storage is key to allow true user-intervention free devices. Current solutions for long term storage (blister packs, stick packs, glass ampules and wax plugs) and deployment in the field typically include reagent storage units which may be manufactured separately and later integrated into the microfluidic device. Such known reagent storage units typically require complex manufacturing and integration capabilities along with external actuators for reagent release. We employ a distinct grade of fluoropolymer that when microfabricated to thin barrier film inserts, allows for creation of a reagent storage chambers within microfluidic chips by minimizing evaporation related losses of aqueous reagents due to its excellent hydrophobic, biocompatible and water/vapor barrier properties. The membrane inserts can be very easily integrated into a device due to an interfacing pressure sensitive adhesive layer which are widely used in biomedical devices. This allows for a significant reduction in manufacture and integration complexity unlike the current multi-layered packs/blister systems. The release of the reagents as and when needed can be tailored to the specific requirements of the device given the wide range of mechanisms. A minimum instrumentation approach can allow passive dissolution of the barrier film by specific water-immiscible liquids (that are also biocompativle) and release using capillary forces (*e.g.*- wicking in lateral flow microfluidic device or a microchannel). Both natural and artificial gravity can also be employed for the barrier film dissolution due to the imiscibility and stratification of the release liquids. A pin-based physical active or passive actuator can also be employed for non-liquid rupture of the barrier film and its release. In its current form, we have demonstrated aqueous reagent storage at room temperature within a range of 90-99% holding capacity over a range of 3 months depending on the bonding technology used in the end device (and over 99% when

devies are stored at 4ºC). *Key USPs: Small footprint and ease of integration. Simplicity of manufacture and integration with a range of devices. Customizable release mechanism (active and passive methods). Compatible with most aqueous reagents (barrier film and release agents are chemically unreactive).*

RESEARCH AND IP STATUS

Priority Patent application filed August 2019 - UK - No: 1911528.6

TYPE OF BUSINESS SOUGHT

Available for licensing. We are also interested to talk to companies interested in collaborations and strategic partnerships.

CONTACTS

Sean Mulvany DCU Invent Glasnevin Dublin 9 Tel: +353 1 7007741 Sean.Mulvany@dcu.ie	Dr. Rohit Mishra FPC@DCU Glasnevin Dublin 9 Tel: +353 1 7007870 Rohit.mishra@dcu.ie