TECHNOLOGY

Creating Artificial Cell Membrane Using Biopolymers in Microfluidic Devices

OVERVIEW

Background

Membrane functionality in microfluidics enables sample separation, concentration, filtration, extraction, pumping, gradient generation, small molecule/cell communication, gas-liquid exchange, pressure measurement, and protein patterning. Of particular interest is the use of membrane structures to separate microfluidic chambers into physically segregated but chemically communicating compartments for cell culturing, toxicity testing, and drug permeability studies, or for reconstruction and investigation of biological membranes. However, the placement of membranes within devices that preserve functionality is nontrivial – extra care is needed for aligning and packaging commercially available polymer membranes; customized membranes can require extra photolithography processes. Moreover, the immobilization of functional chemical or biological entities such as enzymes within the microfluidic networks and specifically on a membrane within such a network is desirable yet challenging.

Innovative Technology

Researchers at the University of Maryland have created an improvement over a previously patented invention involving the biofabrication of a free-standing biopolymer membrane that can be created in situ within the device by manipulating the local environment surrounding the area where membrane creation is needed (Published US patent application 20110081677). The current technology involves an alternative and improvement of the previously patented method with enhanced membrane strength, retained biological functionality and simplified fabrication process.

APPLICATIONS

· Lab on a chip applications
· Physically segregated but Chemically communicating cell culture or other biological studies
· Small Molecule analysis
· Detection kits based on enzymatic reactions
· Drug permeability studies

ADVANTAGES

· Membrane fabrication in prepackaged microfluidic network
· Simple fabrication process and easy scale-up
· Freestanding, vertical membranes in microchannels
· High Mechanical Membrane Strength
· Selective Permeability of biofabricated membrane
· Physical compartmentalization and chemical communication in microfluidics
· Specific immobilization of biological entities on membranes

· No expensive photolithography process required

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

LICENSE STATUS

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CATEGORIES

- Microfluidics

EXTERNAL RESOURCES

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