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Publication date
2023

Document Version
Final published version

Citation (APA)
Yeh, J.-J., Paul, A., Mastrangeli, M., Odijk, M., & den Toonder, J. M. J. (2023). *Micropumping chip module for a standardized and modular organ-on-chip platform*. 94-94. Abstract from 2nd Microphysiological Systems World Summit 2023, Berlin, Germany.

Abstracts of the 2nd Microphysiological Systems World Summit, Berlin, 2023

Volume 11, No. 1
ISSN 2194-0479
doi:10.58847/ap.2301 (2023)

ALTEX Proceedings

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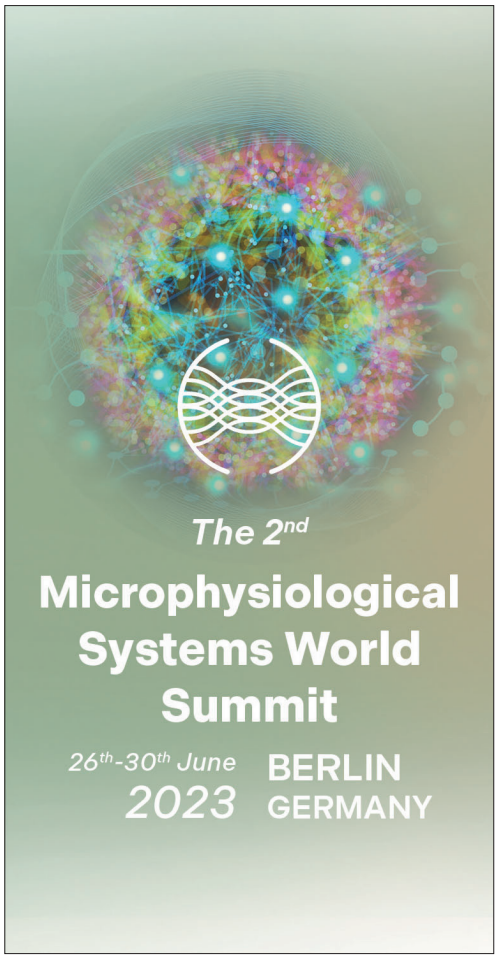
Welcome



Track 1:
MPS Development: Bioengineering Models and Readouts

Track 2:
MPS for Industrial and Regulatory Application: Standardization, QA, Parallelisation and Automation

Track 3:
MPS for Disease Modelling, Safety Testing and Basic Research

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Springer Spektrum

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Micropumping chip module for a standardized and modular organ-on-chip platform

Jia-Jun Yeh[1,2], Aniruddha Paul[3], Massimo Mastrangeli[4], Mathieu Odijk[3] and Jaap M. J. den Toonder[1,2]

[1]Microsystems Section, Mechanical Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands; [2]Institute for Complex Molecular Systems, Eindhoven University of Technology, Eindhoven, The Netherlands; [3]BIOS Lab on Chip Group, MESA+ Institute for Nanotechnology, University of Twente, Enschede, The Netherlands; [4]ECTM, Department of Microelectronics, TU Delft, Delft, The Netherlands

j.j.yeh@tue.nl

Organ-on-Chip (OoC) is a game-changing technology in which human cells are cultured in microfluidic chips to mimic and predict the physiology and pathology of human tissues, as well as to provide insights into drug and disease mechanisms. However, current limitations in manufacturing and technical usability of existing OoC approaches must be overcome in order for industry and regulators to adopt OoCs. Our goal is therefore to develop a Standardized and Modular open-technology OoC platform as a new Approach to Recapitulate human Tissues (SMART OoC), that enables the integration of a novel microfluidic pump. This platform is a further development of the Translational OoC Platform (TOP), which includes a plate with an integrated microfluidic channel network with standardized fluid input/output ports, to which exchangeable chip modules can be connected [1]. To provide fluid pumping to the platform, we are developing a novel micropumping chip module based on magnetic artificial cilia (MAC) [2]. MAC are flexible rod-shaped magnetic micro-actuators inspired by biological cilia, made of polydimethylsiloxane (PDMS) containing magnetic microparticles. MAC can induce microfluidic flow and particle transport when integrated into a microfluidic module and actuated with an external magnet. In this research, we present a novel miniaturized actuation setup for actuating biocompatible MAC integrated in a versatile microfluidic module that generates a variety of fluid flow regimes in the OoC platform. In comparison to other micropumping methods, this module does not require tubings or electrical connections, which opens up a wide range of possibilities for OoC applications.

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Presentation: Poster

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Establishing a quality management plan for microphysiological systems (MPS): Quality parameters and monitoring reproducibility

David Pamies[1,2], Jason Ekert[3], Olivier Frey[4], Monica Piergiovannia[5], Adrian Teo[6], Marie-Gabrielle Zurich[1,2], Hendrik Erfurth[7], Sophie Werner[2,8,9], Peter Loskill[10], Benjamin S. Freedman[11], Thomas Hartung[12] and Glyn Stacey[13]

[1]Department of Biomedical Science, University of Lausanne, Lausanne, Switzerland; [2]Swiss Centre for Applied Human Toxicology (SCAHT), Basel, Switzerland; [3]In vitro In vivo Translation, Research, Pharmaceutical R&D, Collegeville, PA, USA; [4]InSphero, Schlieren, Switzerland; [5]European Commission, Ispra, Italy; [6]Institute of Molecular and Cell Biology, Singapore, Singapore; [7]TissUse GmbH, Berlin, Germany; [8]University of Applied Sciences and Arts Northwestern Switzerland, School of Life Sciences, Muttenz, Switzerland; [9]Department of Pharmaceutical Sciences, Basel, Switzerland; [10]Eberhard Karls University Tübingen (EKUT), Tübingen, Germany; [11]Institute for Stem Cells & Regenerative Medicine, Seattle, WA, USA; [12]Center for Alternatives to Animal Testing, Johns Hopkins University, Baltimore, MD, USA; [13]SSCBIO, Hertfordshire, United Kingdom

olpidium@gmail.com

In recent years, the field of cell cultures has undergone significant development with the goal of obtaining more relevant human data. Many researchers have moved away from classical single-cell and flat models to more complex models, such as organoids, which better mimic human tissue. The development of organotypic cultures, on-a-chip technologies, and other 3D cultures, also known as microphysiological systems (MPS), have shown great potential to generate human models that can reproduce human pathology more accurately. These new *in vitro* models enable advances in both basic research and biomedical applications.

However, due to the complexity of the protocols and the use of new bioengineering techniques in cell cultures, it is more challenging to standardize procedures to ensure reproducibility. There have been numerous efforts to establish adequate guidelines and quality controls for cellular models over the years. For example, Good Cell Culture Practice (GCCP) has produced an initial guideline in 2005, which has been updated by several manuscripts on MPS and with a new revised version of the GCCP guideline (GCCP 2.0). All this aligns with the internationally recognized OECD guidance document on Good *in vitro* Method Practice (GIVIMP) which is intended to support method developers and end-users working to establish new *in vitro* assay methods in academic, industry or government laboratories. Additionally, the Recommended Guidelines for Developing, Qualifying, and Implementing Complex *In vitro* Models (CIVMs) for Drug Discovery have been recently published.

We have now generated or produced a document that aims to provide guidance in the development of appropriate quality con-