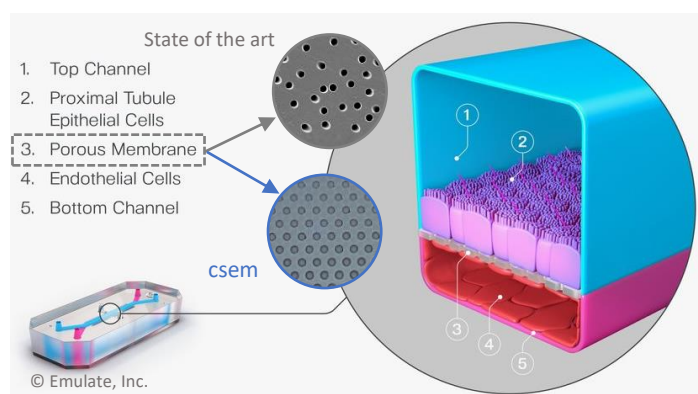


Student project: Organ-on-chip membrane (OOCM)

Background

It takes about 10 years and roughly 3 billion USD for a new drug to complete the journey from initial discovery to clinical application. To make this process more efficient, 3D microfluidic chips containing miniaturized and simplified human organs, so called “organ-on-chip” (OOC) systems hold great promise. Several companies are developing systems to model individual (e.g., kidney-chip shown in the figure) or even multiple organs to sort out ineffective or toxic compounds in early and inexpensive pre-clinical phases. Microporous membranes play an important role in almost all such chips and are typically used to separate different cell populations and/or protect cells from medium channels with high flow rates. The most widely used membranes are track-etched membranes which suffer from low pore quality and strongly



limited porosity. While precision membranes based on MEMS technology could in principle overcome those limitations, they are not applicable because of their brittleness, stiffness, and high fabrication costs. CSEM offers an opportunity to overcome this dilemma by fabricating tailor-made polymeric high-precision membranes using highly scalable fabrication processes.

Project description

In the OOCM project you will fabricate different high-precision tools by photolithography and other microfabrication processes. Using these tools, you will study precision membrane fabrication from different materials. The goal is to find optimum processing conditions that enable both high membrane quality and processing speed. Membranes with different pore sizes and geometries will be fabricated and characterized using various analytical techniques, such as SEM or AFM. Finally, demonstrator membranes will be fabricated and delivered to our industrial and academic partners for testing in their OOC systems.

Framework

The work will be performed at the CSEM labs in Basel (Mattenstrasse 22, 4058 Basel). Suitable as an internship or master thesis project. Duration: 6-8 months (full-time), Start date: As soon as possible, Compensation: Yes

Knowledge/Skills

Background in polymer or microsystems engineering, polymer chemistry or material science. Strong analytical, organizational and English skills required. Hands-on experience in photolithography or other microfabrication processes beneficial.

Contact

Please send your complete application (including short motivation letter, CV, bachelor or master thesis) to Dr. Marc Zinggeler (mzr@csem.ch).

Further reading

www.csem.ch

<https://doi.org/10.1063/5.0019766> (OOC example platform)