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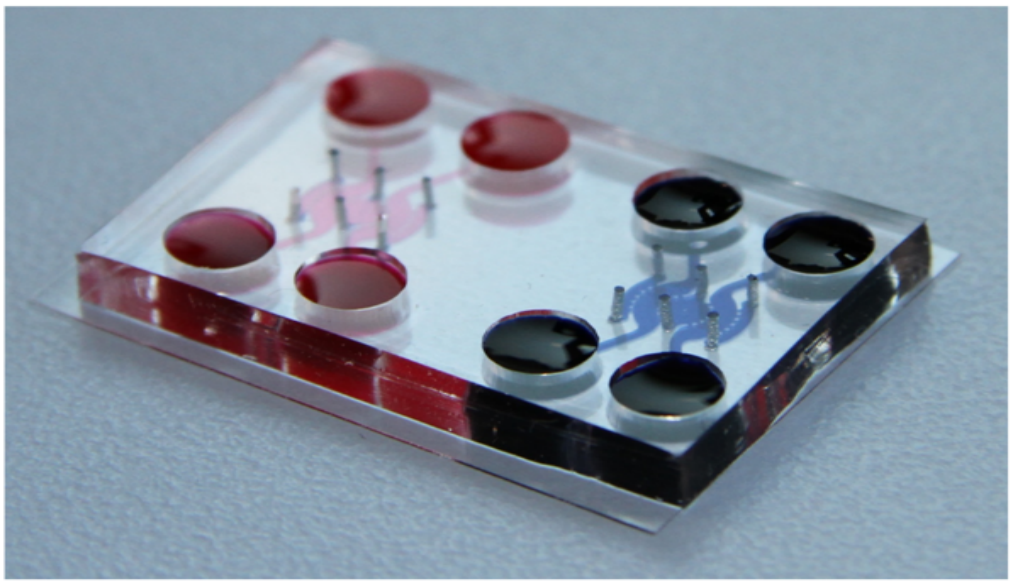
ARTORG CENTER
BIOMEDICAL ENGINEERING RESEARCH

OOCF
Annual Report 2019



ARTORG
Microfabrication &
Organs-on-Chip Facility (OOCF)

OOCF Annual Report 2019

The ARTORG Microfabrication and Organs-on-Chip Facility (OOCF) aims at providing an environment to scientists from the University of Bern, the University Hospital of Bern and beyond, with an infrastructure and equipment that enables the production of microfluidic devices and the testing of organs-on-chips. The facility is part of the ARTORG Organs-on-Chip Technologies (OOC) laboratory headed by Prof. Olivier Guenat. Due to its unique position at the interface between engineering, microfluidics and cell biology, the OOC lab has acquired along the years state-of-the art microfabrication equipment, in particular for soft lithography, as well as for testing organs-on-chip. To answer the request from several research groups it offers since several years the possibility to use its two laboratories. To keep the administrative costs as low as possible an affordable yearly user fee is requested to each group that uses the laboratories. The fees aim at covering parts of the running costs of the laboratories. Both laboratories require an authorization and a short introduction prior to use them (see below). **It is important to point out that ALL new users MUST contact the responsible lab manager to get an introduction and the authorization to use the laboratories.** Both laboratories can be reserved via google calendar**.**

BioMEMS Laboratory

The BioMEMS (bio-micro-electromechanical systems) lab is located at the ARTORG Center, floor E (E408). The lab comprises three parts: the first aims at designing by CAD microfluidic devices, the second for the production of microfluidic devices and the third is the testing of those devices in particular with an upright microscope. The typical production of microfluidic devise is based on soft lithography that consists in the production of a 3D mold, produced either by stereolithography (outsourced), by 3D printing (in-house) or by silicon micromachining (outsourced) depending on the required precision. Once the mold is produced a liquid elastomer (polydimethylsiloxane (PDMS)) is poured on the mold, cured and removed. The PDMS part is then plasma O_2 activated and bonded to a glass plate.

Main equipment of the BioMEMS lab:

- Spin-coater
- PDMS mixer
- Plasma O_2 reactor
- Vacuum desiccator
- Ultra-sonic cleaner
- Hot embossing press
- Laminator
- Upright microscope with incubator

One important staff change took place in 2019. Simon Schweizer, the BioMEMS lab manager, left to focus on his MSc project. We would like to thank him very much here for his constant involvement and thorough work. He has been replaced by Rrahim Gashi, who, like Simon, works 40%, next to his MSc in Biomedical Engineering degree. Rrahim is in charge of the lab since January 2020. Please contact him for support and introductions regarding the BioMEMS lab: rrahim.gashi@artorg.unibe.ch

Rrahim is also available to provide an introduction to the lab and to specific equipment (spin-coater, PDMS mixer,…). Dario Ferrari is responsible for the Axio Imager (new in 2020), please contact him for any info/introduction to this microscope: Dario.ferrari@artorg.unibe.ch

In 2019, a number of equipment had to be repaired or renewed, among others a new spin coater SPIN 150i from the company SPS-Europe (picture left) and a vacuum pump for the plasma cleaner (see table below). Furthermore, the range of one of the microfluidic pumps was extended, for a control at the nanoliter range. For a detailed list of available pumps please contact the BioMEMS lab manager Rrahim Gashi.

Organs-on-Chip Culture Laboratory

The OOC culture laboratory is located at the ARTORG Center, floor U1. It is a BSL-2 cell culture laboratory that requires a specific training prior to be authorized to use it. The laboratory is equipped with:

- 3 cell culture flow hoods
- 4 CO_2 incubators
- Hypoxia station
- RNA flow hood
- EVOM (TEER measurement)
- Standard cell culture equipment (microscope, centrifugator, cell counter, fridges, freezers,…)
- 3D bioprinting equipment (Regenhu) in a cell culture hood.

In 2019, we hired for the first time a lab manager, Sonja Gempeler. Sonja works at 50% and is responsible in particular to provide the authorization to work in the OOC culture lab. Please contact her if you need support and/or an introduction to the OOC cell culture lab: Sonja.gempeler@artorg.unibe.ch

Table: Investments in 2019 in the BioMEMS and the OOC culture lab

Equipment	**Reason for replacement**	**Price** (in CHF)
USC300TH Ultrasonic Cleaner	Old model defective	598.60
SCOLLVAC 7 plus vacuum pump for Plasma Cleaner	Replacement of the older model (lower vacuum)	5’142.70
SPIN150i-NPP Spin Coater	Old model defective	4’245.00
PeriWave Peristaltic pump Micro to Nano conversion	Increase pumping range of a microfluidic peristaltic pump	3’960.00
DI water (OOC culture lab)	Maintenance	
TOTAL investment 2019		**13‘946.30**

NB: A big thank you to Robert Rieben (DBMR) who agreed to cover the costs for the set-up of the CO_2 gas line for the incubator of the upright microscope (4’236CHF).

ARTORG OOCF User Fees

To be able to offer a well-maintained infrastructure and equipment, the following fees are requested from the lab users. A yearly fee is due per research group (typically 2-3 users), who uses the laboratories. The fees aim at covering the costs of the consumables, part of the equipment repair and/or replacement and a small part of the salary of the two lab managers. If you need important amount of PDMS or of other consumables, please inform the lab manager, so that we don't run out of stock (the additional costs will be billed separately). In case someone would like to use the laboratory only once, please contact the responsible lab manager.

For the microscope the MIC user fees of the University of Bern apply.

in CHF	**What**	**Users Uni Bern**	**External Users**
BioMEMS-Lab	Introduction [1)]	30.-	50.-
	Year	1500.-	On demand
Organ-on-Chip Culture Lab	Introduction [1)]	30.-	50.-
	Year	1500.-	On demand
Zeiss Axio-Imager	Instruction [2)]	50.-	100.-
	Use (per hour) [3)]	25.-	50.-
Spin-Coater	Instruction	50.-	100.-
Plasma-Cleaner	Instruction	50.-	100.-

[1)] The general introduction must be completed regardless of whether the lab is used only once or on a regular basis, Contact the responsible lab manager.
[2)] please contact Dario Ferrari (Dario.ferrari@artorg.unibe.ch)
[3)] If extra support is required by the lab technician, an additional 100.- per hour will be charged