



Morning Workshops: (9:00 – 12:00)

Workshop 1

Title: Paper Microfluidics: Integration Challenges & Solutions For Point-Of-Need Testing

Presenter: [Barry Lutz](#) - University of Washington, USA

Target Audience: Presentations will include introductory background appropriate for newcomers with a general knowledge of microfluidics and bioanalytical chemistry (immunoassays, NAAT). More in-depth material will aid existing users of paper devices who wish to develop integrated devices, but this material should also be accessible to newcomers.

Learning Objectives: The workshop will frame the needs and challenges of integrated paper devices for point-of-need testing with a focus on health diagnostics, present specific components with a focus on immunoassays and nucleic acid tests (fluidic automation, reagent storage, sample processing, detection), discuss usability requirements, and provide examples of integrated protein and NAAT diagnostics. Attendees will have the opportunity to contribute their own integration challenges for discussion and input.

Attendees will gain answers to the questions: Why is integration needed? What are the challenges? What solutions are available?

Workshop 2

Title: Organ-on-a-Chip

Presenter: [Paul Vulto](#) – Mimetas B.V., THE NETHERLANDS

Target Audience: Professors, PostDocs and PhD students who want to get a complete overview of the field, both from biology and engineering background. Scientists from pharma- and biotech companies that are considering adopting the technology and specialists in the field that want to contribute to a lively debate.

Learning Objectives: Organ-on-a-Chip went through a massive growth in the last six years. Where is the field standing now? What are the successes what are the challenges? What is the contribution of microengineering, and what of biology? What are the commercial initiatives and who are their customers? Leaders in the field give their perspective on successes and challenges, as well as the future of the technology.

Workshop 3

Title: Droplet and Bubble Microfluidics

Presenter: [Piotr Garstecki](#) - Polish Academy of Sciences, POLAND

Target Audience: The workshop is geared towards PhD students and Postdocs, interested in working with multiphase systems.

Learning Objectives: The attendees should take away a general overview of the physics involved in multiphase microfluidics, the overview of the types of systems, and exemplary uses of these.

Workshop 4

Title: Microfluidic Large-Scale Integration

Presenter: [Sebastian Maerkl](#) – EPFL, SWITZERLAND

Target Audience: The workshop will be of interest to microengineers, biologists, chemists and physicists interested in microfluidic large-scale integration and its application to pertinent problems in current biological research.

Learning Objectives: This workshop covers the design and fabrication of microfluidic devices containing thousands of micromechanical valves fabricated by multilayer soft-lithography. The discussion will focus on their application in biology including single cell studies, protein biochemistry, synthetic biology, and molecular diagnostics.

Workshop 5

Title: 3D Printing for Microfluidics

Presenters:

[Michael Breadmore](#) - University of Tasmania, Australia

[Rosanne Guijt](#) - University of Tasmania, Australia

[Niall MacDonald](#) - University of Tasmania, Australia

Target Audience: The workshop will be useful for those interested in understanding what 3D printing can offer microfluidics, which 3D printer is most useful for specific applications, and for those who are actively 3D printing and wish to improve their designs and applications.

Learning Objectives: This tutorial will provide a brief introduction to 3D printing and the four most frequently used printers in microfluidics. The advantages, disadvantages, and applications of each will be discussed.

Afternoon Workshops (14:00 – 17:00)

Workshop 6

Title: Introduction to Digital Microfluidics (DMF)

Presenters:

[Aaron Wheeler](#) – University of Toronto, CANADA

[Ryan Fobel](#) – University of Toronto, CANADA

[Christian Fobel](#) – University of Toronto, CANADA

Target Audience: The workshop is targeted to a wide audience, and is well-suited to those interested in small volume liquid handling in general. Digital microfluidics is a general purpose, dynamic liquid handling technology suitable for many purposes. Many diverse applications have been demonstrated using DMF including cell culture/analysis, clinical applications, electroanalysis, digital extraction, and more. No prior experience using digital microfluidics is required.

Learning Objectives: The workshop will start with a lecture covering background material related to digital microfluidics, including theory, chip fabrication, and applications. Attendees will then be split into groups of 2-3 to perform hands-on activities moving droplets of liquid using the Dropbot DMF system. Attendees will leave with a general understanding of DMF fundamentals and practical liquid handling experience using the Dropbot DMF system.

Workshop 7

Title: Point-Of-Care Diagnostics

Presenters:

[Aman Russom](#) – KTH Royal Institute of Technology, SWEDEN

[Joan Bienvenue](#) – University of Virginia, USA

[Yoon-Kyoung Cho](#) – UNIST, SOUTH KOREA

[Stéphanie Descroix](#) – Institut Curie, FRANCE

[Victor M. Ugaz](#) – Texas A&M University, USA

Target Audience: This workshop is aimed at graduate students and postdocs, as well as R&D scientists and engineers interested in microsystems technology and applications in point-of-care diagnostics.

Learning Objectives: Point-of-Care (PoC) devices are poised to reshape the delivery of healthcare system in both developed and developing countries. In this workshop, a leading interdisciplinary panel of presenters will give an overview of this rapidly growing field with focus on molecular PoC diagnostics.

Workshop 8

Topic: Cells

Presenters:

[Petra Dittrich](#) – ETH Zürich, SWITZERLAND

[Felix Kurth](#) – ETH Zürich, SWITZERLAND

Target Audience: The workshop is targeted to a wide audience. Postdocs, PhD students as well as industrial researchers are welcome to get an overview of microfluidic cell handling and learn about the potential and limitations of microfluidic approaches for cell biology.

Learning Objectives: Microfluidic technology offers a great toolbox for research with living cells and opens new strategies for cell monitoring and analysis. The workshop will give a comprehensive overview about current microfluidic approaches to cell capture, cultivation, separation, sorting and analysis. Attendees will have the opportunity to discuss current challenges and the future developments in the field

Workshop 9

Title: Nanofluidics: Principles and Applications

Presenter: [Jan Eijkel](#) – University on Twente, THE NETHERLANDS

Target Audience: People working with membranes, gels, nanoparticles, nanopores, colloidal systems, electrochemical systems, separation devices, who are either interested in a fundamental understanding or in adding new dimensions to their systems.

Learning Objectives: This workshop covers the basics and applications of nanofluidics. In contrast to microfluidic systems, a solid surface is always at nanometer distance in a nanofluidic system, influencing both the composition of the solution and its dynamic properties. This causes a multitude of nanofluidics-specific phenomena, which will be discussed. Also, these exceptional properties and phenomena have found numerous applications, which are discussed with an eye on future developments.

Workshop 10

Title: Inertial Microfluidics

Presenter: [Ian Papautsky](#) – University of Cincinnati

Target Audience: This workshop is aimed at students, post-docs and faculty, as well as R&D scientists and engineers with interest in inertial microfluidic phenomena and their biomedical applications.

Learning Objectives: Inertial phenomena in microfluidic systems are of growing interest due to their ability to manipulate bioparticles. Recent studies demonstrated these effects in microchannels of various geometries, including straight, spiral, and serpentine channels. This workshop aims to expose the inertial microfluidic phenomena for applications in bioparticle separation, enrichment, and ordering. Attendees will gain a working knowledge of the fundamentals governing the inertial microfluidics, the approaches used to study these phenomena, and new ways they can be exploited. This workshop is aimed at students, post-docs, faculty, as well as R&D scientists and engineers with interest in inertial microfluidic phenomena and their biomedical applications.