EUROPRACTICE
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# INTRODUCTION TO MICROFLUIDICS AND ITS APPLICATIONS

***EUROPRACTICE webinars***

Needless to say that the availability of fast and accurate medical diagnostics takes a central part in nowadays debates and conversations around COVID-19. Healthcare diagnostics is only one of many applications in which the use of microfluidics may serve the development of massive deployable, affordable and handheld solutions. Other applications relate to drug development, chemical process technology, chemical analysis and even liquid cooling.

While the EUROPRACTICE community is traditionally familiar with the design and implementation of devices and circuits in silicon, most of the microfluidic devices are processed in glass or plastic. With some process technologies being very similar, other manufacturing methods are very different. By introducing electrodes, functionalized surfaces, sensors, ... such microfluidic devices are becoming increasingly complex and move to fully functional stand-alone measurement systems. The combination of both technologies, silicon circuits and microfluidic devices, may lead to even more ambitious application developments.

Both communities are each having their own building blocks, standards and specifications, but a common language is lacking. With these introductory webinars, we would like to give the floor to the experts in the field of microfluidics who will guide you through the basics of microfluidics, its production methods, biochemical assays and example applications.

This course is suited for PhD-students, Engineers, Physicists and Technology and Innovation Managers that are interested in broadening their horizon and want to bridge the gap to heterogenous microfluidic systems.

## Program includes five webinars on Microfluidics

imec

microLIQUID

IMT

micronit microtechnologies

microfluidic ChipShop

- **6 May at 11:00 CEST**
  **Introduction to Microfluidics and webinar goals**
  Dr. Romano Hoofman, imec
- **20 May at 11:00 CEST**
  **Bioassay transfer to microfluidic scale – Opportunities and Challenges**
  Dr. Luis Fernandez, microLIQUID
- **3 June at 11:00 CEST**
  **Glass fabrication of microfluidic flow cells and measurements protocol standards**
  Dr. Alexios Tzannis, IMT Masken und Teilungen
- **10 June at 11:00 CEST**
  **Microfluidic technologies, standards and hybrid solutions for lab workflow automation**
  Dr. Mark Olde Riekerink, Micronit Microtechnologies
- **17 June at 11:00 CEST**
  **Polymer based microfluidic consumables for Life Sciences Applications**
  Dr. Holger Becker, microfluidic ChipShop

## Registration and further information on participation

Please click on the webinar titles above to go to the corresponding registration pages.
The webinars are free of charge.
We encourage you to participate in all five sessions to get a better overview of the topic. However, it is not a problem if you cannot make it on all the dates.

Dr. Romano Hoofman

6 May at 11:00 CEST

## Introduction to Microfluidics and webinar goals

imec, Dr. Romano Hoofman

The first webinar will provide a brief introduction to the world of microfluidics and will introduce the next webinars in this series to get the EUROPRACTICE community acquainted with the field of microfluidic applications. The goal is to create a basic understanding of the generic microfluidic building blocks which will improve communication with specialists from other fields (e.g. biochemists) and, in addition, facilitate the co-development of hybrid devices. The introduction session starts from a well-known and massively employed lateral flow device from which the (basic) necessary microfluidic building blocks are explained. Each of the building blocks is briefly touched upon while referring to the different follow-up webinar sessions.
The overall goal of this EUROPRACTICE webinar series on microfluidic technologies and their applications is not only to enhance the knowledge of its user community, but to make an incremental step towards enlarging the EUROPRACTICE service portfolio with specific microfluidic technologies.

Dr. Luis Fernandez

20 May at 11:00 CEST

## Bioassay transfer to microfluidic scale – Opportunities and Challenges

microLIQUID, Dr. Luis Fernandez

The selection of a good strategy for bioassay transfer is of key importance to develop a successful microfluidic product. Most relevant aspects for the automatizing bio-related processes by microfluidic technology will be identified and discussed. The work should always start from a complete understanding of the bioassay itself. Therefore, we will demonstrate the added value of integrating bio-specialists and bio-related facilities within the microfluidic development team from the start. We will describe the complexity of these processes that require knowledge and expertise in both biology and engineering when it comes to product development. Finally, we will explain the technical difficulties associated with the integration of biological processes within microfluidic systems. The webinar will show different use-case scenarios to explore the most in-demand techniques for transferring to portable and automatic POC platforms. In this way, we will describe the recurring issues of each technique and the advantages associated with the right use of microfluidic technology.

Dr. Alexios Tzannis

3 June at 11:00 CEST

## Glass fabrication of microfluidic flow cells and measurements protocol standards

IMT Masken und Teilungen, Dr. Alexios Tzannis

In this webinar, we describe the fundamental processes utilized to build glass microfluidics components, from mask design, through the individual wafer level processing up to bonding and singulation technologies. We describe possibilities and hurdles in the generations of specific assays and methods around them. Finally we set focus on standardizing certain aspects of glass microfluidic production by proposing metrology and validation processes that are either available in existing ISO Norms or have the potential to define a new metrology standard. We finally describe the way forward from an in-house to a proposed ISO-normed Standard protocol.

Dr. Mark Olde Riekerink

10 June at 11:00 CEST

## Microfluidic technologies, standards and hybrid solutions for lab workflow automation

Micronit Microtechnologies, Dr. Mark Olde Riekerink

This webinar will provide insight into microfluidic technologies and hybrid solutions that may have an enormous impact on the progress in science and healthcare. Microfluidics enables the automation and integration of complex operations on-chip, with reduced sample and expensive reagent volumes. To achieve this, various aspects other than the microfluidics cartridge itself are important like interfacing the cartridge to the outside world or to other components or materials. In this webinar a focus will be on aspects like microfluidic interfacing and standardization, integration of microfluidic functions and subcomponents (such as sensors) and hybrid bonding technologies (i.e. combining different types of materials). After addressing these key elements, some examples of hybrid solutions for lab workflow automation will be presented.

Dr. Holger Becker

17 June at 11:00 CEST

## Polymer based microfluidic consumables for Life Sciences Applications

microfluidic ChipShop, Dr. Holger Becker

This webinar will give an overview over the manufacturing technologies available for polymer-based microfluidic devices for Life Sciences applications. Beyond a short introduction into the available materials, the course will cover both prototyping technologies such as laser-based machining, 3D printing or precision mechanical machining as well as polymer replication methods such as hot embossing, injection molding or thermoforming for larger volume production. The webinar will also investigate the back-up processes in the polymer microfabrication technology chain such as assembly and bonding, surface modifications or hybrid integration of elements such as sensors or electrodes. In addition to the technical elements, aspects for a successful commercialization of microfluidic devices will be discussed.