SMART MedTech Forum

Starting the Continuum: Fast Track to Diagnostics with Semiconductors

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Abstract
Starting the Continuum: Fast Track to Diagnostics with Semiconductors
Molecular Diagnostics opens deep insight into the root-causes of many diseases. However, it imposes a huge effort on medical staff and is both time-consuming and expensive. The Bosch “VIVALYTIC” system is an open platform for the automation of complex molecular diagnostics workflows. It has proven its ability to take molecular diagnostics to the “point of need”. Miniaturization, microsystems and microfluidics technologies as well as microelectronics are the keys to success. The SARS-CoV-2 pandemics has clearly demonstrated the power of the platform to integrate several rapid tests for the detection of SARS-CoV-2 infections within a rather short development time. The first new Corona-test could be made available by Bosch in April this year as an important step to fight the global pandemics and restrict the spread of the disease. Even faster tests are on our development path and close to market entry.
In future, apart from infectious disease diagnostics, our solutions will enable a paradigm shift in medical treatment, away from the "one drug fits all"-approach towards personalized therapies in a "the right drug for the right patient"-strategy. This especially holds for targeted cancer therapies.

Biography
Dr. Franz Laermer joined the Corporate Research and Technology Center of Robert Bosch GmbH, Stuttgart, Germany, in 1990, where he started the development of new key technologies and sensor functions for the upcoming field of Micro-Electro-Mechanical Systems (MEMS) at Bosch. His activities were mainly focused on new microstructuring, surface-micromachining and sacrificial layer etching technologies, as well as micro-accelerometers, gyroscopes and pressure sensors for the automotive area.

Dr. Franz Laermer managed a number of projects which were essential for many generations of microsensors at Bosch. He worked as Project Director for TOP-level innovation projects covering new application fields beyond automotive, including the biomedical area. Today he is working as **Bosch Research Fellow**/Senior Chief Expert for Microsystems, Microfluidics and Molecular Diagnostics. His work laid the foundation for the VIVALYTIC Diagnostics Platform of the newly founded Bosch Healthcare Solutions (BHCS) Business Division and the SARS-CoV-2 rapid tests from Bosch.

Dr. Franz Laermer is the co-inventor of the "**Bosch Deep Reactive Ion Etching Process**" ("BOSCH-DRIE") for microstructuring silicon. This key microstructuring technology revolutionized MEMS and is the root of all of today's silicon based MEMS. He holds more than 200 patents.

Dr. Franz Laermer was awarded with the prize "**European Inventor of the Year 2007 – Category Industry**" by the European Commission and the European Patent Office (together with co-inventor Andrea Urban), for the invention, development and sustainable success of the "BOSCH-DRIE"-process. In 2014 he received the "**2014 IEEE Jun-ichi Nishizawa Medal Award**" from the Institute of Electrical and Electronics Engineers (IEEE), USA. In 2019 he was awarded with the "**2019 Technology Prize**" of the Eduard-Rhein-Foundation, Germany.

Microfluidics market and technology trends

S. Clerc
Technology & Market Analyst – Microfluidics, Sensing & Actuating
Yole Développement, Lyon, France

Abstract
In this presentation I provide an overview of the applications of microfluidic technologies along with market dynamics, then give an update about the role of microfluidics in COVID-19 diagnostics and finally explain the opportunities for semiconductor players in applications that increasingly use silicon, like DNA sequencing and point-of-care diagnostics.

Biography
Sébastien Clerc is a technology and market analyst in Microfluidics, Sensing & Actuating at Yole Développement (Yole). As part of the Photonics & Sensing team, Clerc has authored a collection of market and technology reports dedicated to microfluidics and other micro-devices for major market segments: medical (including diagnostics, pharmaceutical, biotechnology, drug delivery, medical devices) and industrial (including environment, agro-food). At the same time, he is involved in custom projects such as strategic marketing, technology scouting, and technology evaluation to help academic and industrial players in their innovation processes.
Thanks to his technology and market expertise, Clerc has spoken in more than 20 industry conferences worldwide over the last four years. Clerc holds a master's degree in Biomedical Technologies and a master's degree in Innovation and Technology Management, both from Grenoble Institute of Technology (Grenoble INP - Grenoble, France).

Artificial Intelligence in Healthcare Delivery

H. Huisman
Associate professor
radboudumc, Radiology, Nijmegen, Netherlands

Abstract
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Biography
Henkjan Huisman is an associate professor of radiology on AI for medical imaging at the Radboud University Medical Center, The Netherlands. He has over 30 years of experience in scientific research, prototyping, and clinical validation of medical imaging AI. His research team explores and uses AI to better understand disease, diagnosis, and therapy in the field of abdominal ultrasound and MRI aiming to improve healthcare.

Early Diagnosis and Prevention of Pressure Induced Wounds (Ulcer) at Vulnerable Patients

L. Grünerbel
System Engineer
Fraunhofer EMFT, Munich, Germany

Abstract
Pressure induced wounds (Ulcer) lead to high stress and pain for all sufferers. There are two main types of ulcer, which are decubitus with more than 400.000 cases annually [2] and the diabetic foot syndrome resulting in around 40.000 feet amputations every year only in Germany [1]. The therapy is very long lasting, painful for patients and expensive for the health care system. However, according to many experts most of these wounds could be avoided by proper prophylaxis [1]. One part of a promising prophylaxis system is the accurate observation of especially endangered body positions. Therefore, we develop a sensor system that is tracking the pressure load on those endangered positions. In combination with other body parameters such as blood oxygen saturation, heart rate and skin temperature, we use modern machine learning algorithms (AI) to determine parameters that allow forecasting the probability of wound formation. The findings will lead to a smart and handy forecasting system that warns patients if the wound probability increases significantly.

Biography
Lorenz Gruenerbel, M.Sc. (m) successfully graduated at the Technical University of Munich. His topmost degree is a Master in Electrical Engineering and Information Technology. Additionally, he received a Bachelor in Management and Technology at the Technical University of Munich. During his Master's he already focused on subjects of medical technology at Fraunhofer EMFT. Since March 2018, he is working there within the field of system development focusing on medical applications. As a Ph.D. student, he is doing research on modelling and high flow optimization of Fraunhofer EMFT micro pumps.

References:
[1] Deutsches Ärzteblatt, (2020), Diabetisches Fußsyndrom: Risikopass soll unnötige Amputationen vermeiden, Website, https://www.aerzteblatt.de/nachrichten/114949/Diabetisches-Fusssyndrom-Risikopass-soll-unnoetige-Amputationen-vermeiden, 2020-07-30
[2] IQTIG, (2018), Pflege: Dekubitusprophylaxe, Website, https://iqtig.org/downloads/auswertung/2017/dek/QSKH_DEK_2017_QIDB_V02_2018-04-25.pdf, 2020-07-30

Manufacturing Technologies for Next-Generation Microfluidics

B. Dielacher
Business Development Manager
EV Group, St. Florian am Inn, Austria

Abstract
Microfluidic-based products are experiencing a high growth rate in many healthcare applications such as clinical diagnostics and pharmaceutical research. Devices are becoming increasingly complex and include components with different form factors and materials. In addition, the increasing use of silicon and glass towards instrument-free consumables represents a huge potential for semiconductor-based manufacturing technologies. As a market-leading supplier of wafer bonding and nanoimprint lithography (NIL) equipment, we will demonstrate how these technologies are used in the fabrication of microfluidic chips. We will discuss NIL as a powerful high-volume manufacturing solution capable of producing the most complex and smallest structures, making it ideal for next-generation microfluidic device production. Furthermore, hybrid integration schemes such as CMOS or biosensor integration will be demonstrated.

Biography
Dr. Bernd Dielacher is business development manager at EV Group where he is responsible for the MEMS as well as the bio- and medical technology market.

Bernd holds a master's degree in Microelectronics from Vienna University of Technology and received a PhD in Biomedical Engineering from ETH Zurich, where he explored metal nanostructures for electrical and plasmonic sensing in biomedical applications.

From Sensing to Action

G. Olivadoti
Director, Digital Healthcare Marketing and Applications
Analog Devices, Wilmington, United States

Abstract
The coronavirus pandemic has caused immeasurable impact on both human and economic levels. It has shown the fragility of healthcare systems and accelerated adoption of telehealth solutions, including remote patient monitoring and testing technology. Reliable wearable and remote patient monitoring systems depend on precision measurements. This session will explore trends in sensing and measurement technologies that enable and empower remote patient monitoring systems of the future.

Biography
Giuseppe Olivadoti joined Analog Devices in 2000. During his time at ADI he has held a number of positions across engineering, sales, and business leadership. Giuseppe is currently the Director of Marketing and Applications for the Digital Healthcare business at Analog Devices. Prior to this role, he has held sales leadership positions in Europe and the Americas.
Giuseppe holds a Bachelor of Science degree in Electrical Engineering from Northeastern University and a Master of Business Administration from University of Phoenix. Giuseppe currently resides in the Boston area.

How the COVID-19 Exposes the Flaws of Current HealthTesting - Hypermobility & Microfluidics for Health 4.0 Tools for new Medicine

A. Tinazli
Chief Commercial Officer
Fluxergy, Irvine, United States

Abstract
The rapid spread of COVID-19, which has the potential to become a once-in-a-century pandemic, has demonstrated that current diagnostic testing methodology is too slow and too inaccessible to address today's dramatically changing healthcare challenges. New technologies are needed immediately that provide fast, accurate, and low-cost tests directly at the Point of Care.

Biography
Prior to his role at Fluxergy as Chief Commercial Officer, Dr. Ali Tinazli has been leading the corporate-wide, global strategy for Healthcare and Life Sciences for Hewlett-Packard (HP Inc.). He currently serves as Board Member and Angel Investor at various start-up companies ranging from cyber security and digital health to oncology – one of the start-ups (Edico Genome) got recently acquired by Illumina. Dr. Ali Tinazli has a deep background in the science and business of biomedicine and healthcare. Ali has done extensive work in the field of molecular biology of aging and nanobiotechnology and has authored about 20 publications. He received his Ph.D., excellent with highest honors, in BioChemistry from J.W. Goethe University in Germany, and also studied business at UC, Berkeley's Haas School of Business and MIT's Sloan School of Management. After receiving his Ph.D., Ali was in Corporate Development at Applied Biosystems (now: Thermo Fisher) where he conducted technology scouting and in-licensing. At Sony DADC (part of SONY Corporation and now Stratec), Dr. Tinazli was key in building the biomedical consumables business. As a member of the management team at Sony DADC BioSciences, he has headed as VP & Head of Business Development the Americas business based out of Cambridge, MA. In addition to his bioscience and industry domain experience, Ali has strong entrepreneurial experience and hands-on knowledge of the biosciences start-up community.

Next generation insulin pumps using new technologies

T. Pieber
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Medical University Graz, Graz, Austria

Medical University of Graz

Abstract
During the last decade, healthcare has been attracting immense R&D effort, following the path of digitalization. Especially, the areas of electronics and sensing exhibit a huge potential and impact, to develop new and accurate medical devices. Here we will discuss the path to novel, smart, and small applications for insulin therapy in the growing field of diabetes.

Biography
Thomas Pieber is Professor of Medicine, Chair of the Department of Internal Medicine, and Head of the Division of Endocrinology and Diabetology at Medical University Graz, Graz, Austria. He is also Director of the Institute of Biomedicine and Health Sciences at Joanneum Research in Graz and founder of CBmed, a competence centre for biomarker research.
Professor Pieber has written more than 450 original papers and reviews in peerreviewed journals, and made in excess of 1000 abstract and congress presentations.
He is a member of the International Working Group on the Diabetic Foot and a member of the international Cochrane Review Group “Endocrine and Metabolic Diseases”.
Among several scientific awards, in 2010 he received the Somogyi Award, which recognises the scientific achievement of a person who significantly contributed – either experimentally or clinically – to the better understanding of hypoglycaemia and counterregulatory mechanisms. Professor Pieber is reviewer for several international journals and advices the Austrian Government regarding the national research strategy.