SMART Medtech

Welcome Remarks

L. Altimime
President
SEMI Europe, Berlin, Germany

Abstract
Coming Soon

Biography
Laith Altimime, as President of SEMI Europe, leads SEMI's activities in Europe and the Middle East and Africa (EMEA). Altimime has P&L responsibility as well as ownership of all Europe region programs and events, including SEMICON Europa. He is responsible for establishing industry standards, advocacy, community development, expositions, and programs. He provides support and services to SEMI members worldwide that have supply chain interests in Europe. He manages and nurtures relationships with SEMI members in the region and globally as well as with local associations and constituents in industry, government, and academia. Altimime has more than 30 years of international experience in the semiconductor industry. Prior to joining SEMI in 2015, He held senior leadership positions at NEC, KLA-Tencor, Infineon, Qimonda and imec. Altimime holds an MSc from Heriot-Watt University, Scotland.

Intersecting Paths: Uniting Moore's Law and Biology Through Bioconvergence

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Abstract
Intersecting Paths: Uniting Moore's Law and Biology Through Bioconvergence
For more than 4 billion years, nature has been perfecting its biological systems, developing solutions that scientists and engineers are just beginning to grasp and utilize. Leveraging synthetic biology, a myriad of applications - ranging from antibiotic development to laundry detergent enzymes, even to DNA data storage - have come to fruition.
Biological systems inherently possess the ability to self-assemble, self-repair, and self-replicate. This gives them an edge that critically affects capacity, precision, and cost-efficiency, metrics highly relevant in the material science as well as manufacturing process.

Recent technological developments allow us to read (sequence) and write (synthesize) DNA with greater ease and accuracy. This exponential advancement in our ability to 'program' DNA propels a technological revolution mirroring the computer surge of the 20th century and impacting manufacturing on a scale reminiscent of the 19th-century industrial revolution.
In the domain of synthetic biology, two fundamental design principles particularly stand out - the concept of reusable parts and the engineering design cycle. The engineering design cycle, also applied in the semiconductor industry, simplifies the engineering process into three stages: design, build, and test. This structure's ability to scale exponentially implies that we are now able to function within the framework of Moore's Law. This principle, established in computer manufacturing, indicates that capacity successfully doubles approximately every 2 years over extensive periods.
Moore's Law's relentless pace has become the benchmark for significant, long-term industrial progress. This pace is now attainable in gene synthesis. As we transition from conventional manufacturing to 'smart' manufacturing, we are harnessing the incredible compute power that Moore’s Law has provided for image and pattern recognition and massive data set analysis to drive manufacturing efficiency.

Biography
Dr. Nina Siragusa is the Chief of Staff to Dr. Laura Matz, the Chief Science and Technology Officer at Merck. As part of the Science and Technology Office Leadership Team, Nina is responsible for enabling and driving cross-sectoral collaboration, innovation strategy and digitalization at Merck across the 3 business sectors. She is leading the strategic efforts on Bioconvergence. As part of her MBA studies on Digital Transformation Management at the Goethe Business School, Frankfurt Germany, Nina is leading a project within the Group Smart Manufacturing Program.

Prior to becoming Chief of Staff, Nina has been driving corporate innovation as Biotechnology Lead of a synthetic biology innovation project, Senior Manager responsible for the creation of strategic alignment as well as building and management of high performing teams and finally as Associate Director responsible for targeted sourcing of innovative ideas, with the goal to generate new businesses.

Nina has a PhD in Biology from the University of Tuebingen, Germany. She has worked as a researcher in Europe and the USA at Yale University prior to joining Merck KGaA, Darmstadt Germany in 2016.

Machine Learning Supported Self-Sensing Micropump to Detect Air Bubbles to Improve Dosing Accuracy

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Abstract
When administering drugs with microdosing systems based on micropumps, air bubbles, which cannot be avoided, are a huge disturbance of the micro dosing. On the one hand, bubbles replace the liquid to be dosed, on the other hand the compressibility and surface tension of the bubble can influence the dosed volume of the micropump. Bubble and pressure sensors are commonly used to detect those events, increasing system complexity and cost significantly, which is a hurdle for disposable applications like drug delivery. To detect bubbles, a radically new approach is taken without any additional sensor and without modifying the micropump, just detecting and analyzing the driving signal: indirect piezo effect is exploited to generate stroke volume by a periodic electrical driving signal. Parallelly, direct piezo effect is used: the piezo displacement changes the pump chamber pressure, which moves electrical charge to the piezo and is detected as “sensor current”. This time dependent signal is like a “fingerprint” of the pump cycle. It is processed by the system controller, without influencing the drive signal of the piezo. The data processing is extended by machine learning algorithms (ML algorithms) and integrated on the STM-microcontroller (edge device). The ML algorithms are trained with measurement data in a measuring station.

Biography
Since 2001, Martin Richter is managing the department Microdosing Systems at Fraunhofer Institute for Electronic Microsystems and Solid State Technologies (EMFT) in Munich. Before, he studied Physics at the Technical University in Munich, and achieved his PhD in the field of microfluidic systems in 1998. His mission is to industrialise microdosing systems, based on micropumps, for various industrial applications with a focus to medical applications.