Plenary speaker: Albert van den Berg, University of Twente, The Netherlands - *Labs and Organs on Chip for Health and Environment*

Albert van den Berg received his MSc in applied physics in 1983, and his PhD in 1988 both at the University of Twente, the Netherlands. From 1988-1993 he worked in Neuchatel, Switzerland, at the CSEM and the University of Neuchatel (IMT) on miniaturized chemical sensors. In 2000 he was appointed as full professor on Miniaturized Systems for (Bio)Chemical Analysis in the faculty of Electrical Engineering and part of the MESA+ Institute for Nanotechnology. In 1994 he initiated together with Prof. Bergveld the international MicroTAS conference series. He published over 500 peer reviewed publications (H=69 WoS, H=97 Google Scholar) a.o. in Science, Nature, PNAS, PRL, Angewandte, NanoLetters, ACS Nano etc, and from his group > 10 spin-off companies started. He received several honors and awards such two ERC Advanced (2008, 2015) and four ERC Proof of Concept (2011, 2013, 2016, 2020) grants, Simon Stevin award (engineering sciences, 2002), Spinoza prize (2009), Distinguished University Professor (Twente, 2010), Distinguished Professor (South China Normal University SNCU (China), 2012), Consulting Professor at Northwestern Polytechnic University NPU (China), 2017) and member of the Royal Dutch Academy of Sciences (KNAW) (board member from 2011-2016). From 2014-2018 he was scientific director of the MIRA institute for Biomedical Engineering. In 2017 he became co-PI of the Max Planck - University of Twente Center for Complex Fluid Dynamics. In 2018 he became (co)director of MESA+ institute for Nanotechnology. He has been editor of Sensors and Actuators B, cofounding member of the editorial board of the RSC journal Lab on a Chip, founding member of EUROoCS, the European Organ on Chip Society and founding director of the CBMS, the Chemical and Biological Microsystems Society. In 2022 he was elected member of the SATW (CH). His current research interests are micro/nanofluidics, Labs on Chip and sensing for health and sustainability and Organs on Chip. His current activities include acting as one of the quartermasters of the UT Climate Centre.

Abstract: The recent rapid developments in bionanotech and micro/nanofluidic technologies has enabled the realization of miniaturized laboratories. These Labs-on-a-Chip will play an important role in future medicine, both in point-of-care devices for drug or biomarker monitoring, as well as in early diagnostic devices. Microfluidics can also be exploited to manipulate and experiment with cells on chip. We have developed a microsystem for sperm analysis and selection for artificial insemination, where we can electrically detect and sort healthy sperm cells. Apart from diagnostic and cell manipulation devices, microfluidic devices are increasingly used to realise advanced disease and organ-models, as illustrated by the blood-brain barrier chip and a blood vessel on a chip to study atherosclerosis. These Organs on Chip may lead to more rapid and cheaper drug development, personalised medicine and improved disease models, while minimizing or even eliminating animal testing (3R principle). We have developed a Translational Organ on Chip Platform (TOP) that enables simple plug and play connection of different Organ on Chip modules to a fluidic base plate. Finally, examples of microfluidics for climate are presented. A microfluidic impedance spectroscopy system will be presented that can monitor the calcification of coccolithophores (algae), while some initial work on a microreactor to study accelerated weathering of olivine will be discussed.