



Prof. Norihisa Miki

Keio University

Title:

Micro-Nano Technology/Concept-Based Medical & Healthcare Devices

Abstract:

Micro-nano technologies enables us to manufacture micro-nano functional structures of a wide variety of materials. This opens up the new design spaces of the innovative devices. Not only the technologies but also the concept often lead to new inventions. In this presentation, I introduce two devices: Azinzo and Saltchip.

Azinzo is an implantable artificial kidney that will drastically improve QOL of the dialysis patients. It is composed of multi-layered micro channels that are separated with nanoporous dialysis membranes. Azinzo filters blood to remove water and low-molecule-weight ions, which are transferred to the bladder and discarded as urine. I will be introducing the most recent results and in addition, the challenges that we have encountered.

Saltchip is an adhesive chip-size polymeric material. It contains a minute amount of salt and can be attached to the backside of a tooth or the upper jaw. It gradually dissolves and deliver sodium ion to taste receptors on a tongue rather directly. This invokes strong salt taste despite the small amount of salt included in the saltchip. We can eat and drink with the saltchip attached, which can enhance the salt taste. This will help salt intake

reduction, which is necessary for high-pressure and kidney patients. The idea of saltchip was inspired by the drug-delivery technology; by positioning a drug in the vicinity of the diseased parts, the amount of the drug can be reduced and thus the side effect of the drug can be alleviated.

In order to deliver these two devices to the users, they need to be commercialized. We founded LTaste inc. to sell the saltchip and are planning to found Azinzo inc. for Azinzo. As a matter of course, we have encountered many challenges, some of which originate from the characteristics of the fields. I am going to share the lessons learnt with the audience.

Biography :

Norihisa Miki received Ph.D. in mechano-informatics from University of Tokyo in 2001. He developed a world-smallest drone using MEMS technology during his Ph.D. Then, he worked at MIT microengine project as a posdoc (2001-2003), later as a research engineer (2003-2004). He joined the Department of Mechanical Engineering at Keio University in 2004 as an assistant professor and became a full professor in 2017. His research interests started with development of MEMS-based biomedical and human interface devices. Currently, he also explores the fields of medical engineering, neuroscience, and media arts using his innovative devices. He was a researcher of JST PRESTO (Information Environment and Humans) from 2010 to 2016 and Kanagawa Institute of Industrial Science and Technology (formerly, Kanagawa Academy of Science and Technology) from 2010 to present. He is a member of IEEE and JSME micro-nano science and technology division. He is a general chair of the 8th and 9th Symposium on Micro-Nano Science and Technology in 2017 and 2018 sponsored by JSME. He co-founded a healthcare startup LTaste Inc. in 2017. He is a Director of Keio Ice Skating Club.