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Presents

A Rapid and Ultra-High Sensitive Immunoassays for Point-of-Care Test (POCT) using Microfluidics and Lab-on-a-Chips

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Lab-on-a-chips (LOC) with microfluidics have been used as one of the most promising platforms for immunoassays or ELISA, aiming clinical diagnostics, biochemical hazardous agent detection, or food inspection. The surface area to volume ratio of the microfluidic channel or chamber on the LOC represents a 50-fold increase when compared to the well of a conventional 96-well immunoassay plate. The large surface area to volume ratio increases binding kinetics dramatically and allow rapid reactions. So, immunoassay reactions in the microchannel are inherently more efficient due to the large surface area to volume ratio and the short diffusion distances. In addition, owing to the fast reaction kinetics at micro scale, the microfluidic reaction can be used for a point-of-care testing (POCT) which usually requires a rapid analysis. So, the combination of lab-on-a-chips and microfluidics is attractive for the POCT diagnostics with rapid response, high sensitivity and small sample volume. Microfluidics is a new game changer for rapid and ultra-high sensitive immunoassays, in vitro diagnostic (IVD) and point-of-care test (POCT). In this presentation, the distinctive natures of microfluidics on lab-on-a-chips are discussed first and then its applications to immunoassays, clinical diagnostics, IVD or POCT are presented. A couple of commercialized products from Siloam Biosciences Inc, which was founded by the speaker, will also be introduced.

Dr. Ahn is Mitchell P. Kartalia Chair Professor of Engineering in the Department of Electrical Engineering and Computing Systems at the University of Cincinnati. He is currently Co-Director of the Ohio Center for Microfluidic Innovation (OCMI) at the University of Cincinnati, which was funded from the Ohio 3rd Frontier Wright Projects Program. He obtained his Ph.D. degree in Electrical Engineering from Georgia Institute of Technology in 1993. Prior to joining the University of Cincinnati, he worked as a Post-Doctoral Fellow at IBM T. J. Watson Research Center, NY, USA. Since joining the University of Cincinnati in 1994, he has successfully initiated and established an excellent Microfluidics and BioMEMS program (www.biomems.uc.edu) at the University of Cincinnati, and he has been recognized internationally as one of the pioneers in the BioMEMS and lab-on-a-chip fields. One of his key inventions and pioneering contributions includes the new concept of *"smart polymer lab-on-a-chip"* for the point-of-care testing (POCT) clinical diagnostics and "*lab-on-a-tube"* for the neurosurgical diagnostics of traumatic brain injury (TBI). He has published over ~300 journal and peer-reviewed conference papers, and chaired numerous international conferences and steering committees. His research interests include the design, simulation, fabrication and characterization of MEMS and BioMEMS devices, microfluidic device and systems, biosensors and biochips, lab-on-a-chips, *in vitro* diagnostics (IVD), and point-of-care clinical diagnostics or neurosurgical monitoring. He received the Scientific Leadership Award at the 4th Annual BioMEMS and Biomedical Nanotechnology World in 2003 and received the Best Journal Paper Award of the IEEE Sensor Journal in 2009. He is currently serving as an Editor of the IEEE/ASME Journal of Microelectromechanical Systems (JMEMS), and Editorial Boards of the Journal of Micromechanics and Microengineering (JMM), Journal of Microfluidics and Nanofluidics, and Current Nanoscience. He is now a Fellow at the Institute of Physics. He was the founder of Siloam Biosciences Inc. (www.siloambio.com) in Cincinnati, Ohio, USA.

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