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Lab-on-a-chip device for point-of-care in-vitro diagnosis

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Lab-on-a-chip devices that incorporate microfluidics, electronics, acoustics and photonics provide a new, versatile platform for in-vitro diagnosis of cancers and other diseases. Because of the advantages of low cost, easy operation, low sample volume, and fast results, they are particularly suitable for point-of-care clinics. In this presentation, we will discuss a variety of lab-on-a-chip devices that can detect pathogens and cancers at the cellular and molecular levels. The underpinning technologies are based on micro flow cytometers with single-cell sorting capabilities and electrophoretic devices that can collect, isolate, and concentrate RNAs and cell-free DNAs. Examples of applications of these devices include detection and separation of circulating tumor cells (CTCs), miRNAs, and proteins from whole blood samples. The performance of the devices will be compared with today's gold standard for their efficacy in clinical applications. If time permits, we will discuss how lab-on-a-chip devices can not only replace the current medical practices in a more affordable and cost effective manner, but also enable new features and capabilities not achievable with existing methods and instruments. The latter includes single cell analysis and single cell genomics and epigenetics.

Biography

Yuhwa Lo received his PhD in electrical engineering in 1987. He has been a Professor of the Electrical and Computer Engineering Department of UCSD since 1999 and the Director of the Nano3 (Nanoscience, Nanoengineering, Nanomedicine) Facility of the California Institute of Telecommunications and Information Technologies (Calit-2) since 2006. He has published over 350 papers and been awarded 26 patents. His research interests include microfluidics, lab-on-a-chip devices, biomedicine, biophotonics, and nanophotonics. He is a fellow of the Optical Society of America and the Institute of Electrical and Electronics Engineers.

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