

Abstract

Microfluidic Sensors for Diagnosing Disease at the Point-of-Care

There is a large unmet need for rapid diagnostic tests in developing countries and other resource-poor settings where the high cost of testing and lack of laboratory equipment, infrastructure, and skilled personnel all present barriers to proper disease prevention and treatment. Microfluidic sensors, also known as lab-on-a-chip (LOC) devices, offer unique opportunities to address these challenges. Their small feature size (0.1 μm – 100 μm) enables lower consumption of costly reagents, shorter reaction times, and permits multiple laboratory processes to be completed on a single platform. General approaches to biosensing (nucleic acid, protein, and whole-cell) will be presented along with design considerations for microfluidic integration and analytical performance characterization. As an example, the development of two microfluidic sensors targeting early detection of oral cancer and acute/persistent gastroenteritis will be described.

Academic Biography – Shannon E. Weigum

Dr. Weigum received her B.A. in Biology and Science Education from Texas A&M University in 1997. Upon graduation, she taught high school Biology, Chemistry and Physics for three years in San Antonio and Austin. In the Fall of 2000, she entered graduate school at Texas State University, where she received a M.S. in Biology (2002) followed by a Ph.D. in Biochemistry from the University of Texas at Austin (2008). She then completed a two-year Postdoctoral Fellowship in Bioengineering at Rice University. She is currently an Associate Professor at Texas State University in the Department of Biology and is a core faculty member of the newly established Materials Science, Engineering and Commercialization Program. Her research is focused upon the development of novel optical and microfluidic devices for diagnosing disease at the point-of-care. She has published fifteen peer-reviewed manuscripts and poster abstracts, one book chapter, and holds one US patent. Her work has been featured nationally in *Popular Science*, CNET news and on the cover of the journal *Lab-on-a-Chip*.