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Ultrasensitive, multiplexed detection of infectious disease markers using a surface-enhanced Raman scattering immunoassay platform

Marc D. Porter
University of Utah, USA

Abstract

Early detection is central to combating infectious diseases, cancer, and bioterrorism. This presentation investigates the development of extensible platforms and readout methodologies that address these needs by coupling gold nanoparticle labeling and ultrasensitive detection by surface enhanced Raman scattering. Approaches will be detailed for the fabrication and readout of chip-scale platforms that can be employed for the reliable determination of disease markers in serum and urine matrices, probing fundamental and real-world issues for optimal performance by using tuberculosis (TB) markers as a test vehicle. TB is the world's second deadliest infectious disease after HIV/AIDS. The World Health Organization has called for the development of a robust, reliable, and accurate detection method that does not suffer from the poor accuracy of current serological-based techniques. This work will specifically examine the utility of protein arrays as an immunodiagnostic platform designed and tested for the rapid, ultralow level measurement of various potential TB markers. Challenges related to sensitivity, speed, and nonspecific adsorption, and fluid manipulation will also be discussed.

Biography

Dr. Marc D. Porter graduated from Wright State University (B.S. and M.S.) and The Ohio State University (Ph.D.). After a post-doctoral fellowship at Bell Laboratories, he joined the Chemistry faculty at Iowa State University and then the Chemistry/Biochemistry faculty at Arizona State University. He is now at the University of Utah and is the director of the Nano Institute of Utah. Porter's laboratory works on fundamental issues and applications of liquid-solid interfaces (e.g., nanotechnology and its applications to human and animal health). He also led an interdisciplinary team that designed a water quality analyzer, now permanent hardware on the International Space Station.