



Dr. Mike McShane

*Professor
Department of Biomedical Engineering
Texas A&M University
College Station, Texas*

ECE SPEAKER SERIES

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10:00am-11:00am

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IMPLANTABLE OPTICAL BIOSENSORS: MATERIALS FOR NEXT-GENERATION MONITORING

Abstract:

Personal health monitoring is becoming increasingly accessible as the ease of producing low-cost, low-power embedded systems has fueled a rapid growth in consumer products aimed at “measuring me.” While new products are released regularly, a major technology gap is in the space of continuous chemical sensing. Commercial devices for continuous glucose monitoring are examples of progress in this area; yet, they are invasive and lack longevity. Fully-implantable or completely noninvasive systems face significant hurdles to implementation. Our research is focused on developing miniature, injectable, “passive” biosensor implants with microscale and nanoscale organization to enable observation of interstitial biochemistry. These materials provide specificity through use of specific receptors and enhance sensitivity through optical amplification; specifically, these hydrogel-based biochemical sensors change optical properties as measured by luminescence intensity and lifetime or Raman scattering. Further, they employ materials that can integrate naturally with tissue, such as porous gels and microparticle suspensions, enhancing prospects for accurate, rapid response and long-term monitoring. This talk will briefly overview the state of the art in wearable medical devices, focusing on non-/minimally-invasive diagnostics and monitoring tools. After reviewing recent advances and current trends, the solutions being pursued in our research will be described. Finally, the lecture will highlight the major challenges to long-term in vivo monitoring.

Biography:

Dr. Mike McShane is Professor in the Departments of Biomedical Engineering and Materials Science & Engineering and is currently Director of Graduate Programs for BME. He has a broad engineering background, with specific training in instrumentation, optics, biosensor technology, and biomaterials with extensive experience in micro/nanofabrication for smart materials. Prior to joining Texas A&M, Professor McShane was on the faculty of Louisiana Tech University from 1999 to 2006 (Biomedical Engineering and the Institute for Micromanufacturing). Over the past 20 years, Prof. McShane has pioneered the use of micro/nanoparticles, capsules, and polymer-particle composites for development of optical biosensing systems, including some being evaluated for inclusion in commercial products. This research is primarily funded by the US National Science Foundation (NSF), National Institutes of Health (NIH), and private companies, and has resulted in approximately 100 journal papers and book chapters. Professor McShane is a fellow of AIMBE, a Senior Member of IEEE, and President of the IEEE Sensors Council (2016-2017).

For additional information, please contact Dr. Wei-Chuan Shih at wshih@uh.edu

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