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ELECTRICAL & COMPUTER ENGINEERING

Friday, November 7
10:00—11:00 am

FIU Engineering Center
EC Room # 1107

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"Microfluidic Systems: Platforms for Chemical Analysis and Fabrication of Biomimetic Constructs"

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ABSTRACT

The advent of microfluidic systems some two decades ago has culminated in the development of an array of smaller, less expensive, more sensitive analytical platforms capable of more rapid chemical analyses, as well as the facile on-chip chemical synthesis of fibers, particles, and tubules that span the macro, micro, and nano scales. The characteristic low Reynolds number laminar flows within these systems has fostered the production of high aspect ratio microstructures in the fabrication of chemical sensors capable of performing in the marine environment while quantitating nitroaromatics in the 10 ppt range enabling the detection and more precise localization of compromised unexploded ordnance on the sea floor.

Additionally, my lab seeks to tease out the synergies that exist between microfluidic systems, biological cells, and ex vivo biochemical synthesis. Rapid kinetics and mild reaction conditions of "Click-chemistry" within the low Reynolds number flows has been used to form nested concentric flows of various cell suspensions protected by innocuous sheath fluids within microsystems. This was accomplished by the incorporation of flow altering geometries into the microchannels to induce hydrodynamic focusing influenced by systemic advection. The resultant flows were photopolymerized in situ using low dose UV-A irradiation. Principles of microfluidic systems, chemical sensing, click chemistry, and biohybrid materials will be presented followed by recent results from our work in these exciting areas.

BIOGRAPHY

André A. Adams received his B.S. in Chemistry from Grambling State University in 2000. After stints at the E.O. Lawrence Berkeley National Laboratory and the Dow Chemical Company as an analytical chemist, he entered the Department of Chemistry at Louisiana State University. He obtained his Ph.D. in Bioanalytical Chemistry in 2008 under the supervision of Steven Soper. His dissertation research focused on the development of systems for rare cell isolation and enumeration from complex matrices by exploiting microfluidic platforms and immunoaffinity for selective isolation and quantitation. Dr. Adams joined the Naval Research Laboratory as a National Research Council Postdoctoral Research Associate in 2008, and focused on the development of chemical sensing platforms for autonomous underwater vehicles.

In 2011, Dr. Adams became a federal scientist, and initiated research programs directed at the development of biohybrid materials using microfluidic systems that employ sheath flow in conjunction with on-chip click chemistry to create encapsulated cellular constructs. Current interests include explorations into sensing, 3D in vitro models, biomaterials, complex co-culture, angiogenesis, and anastomosis.