Keynote Lunch Address

"Trillion Sensors for Health Care"

Presented by Dr. Ahmed A. Busnaina,

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12:15 – 12:45 - Exhibit Hall

Keynote Abstract

Printing offers an excellent approach to making sensors and devices using nanomaterials, however, current electronics and 3D printing using inkjet technology, used for printing low-end electronics are slow and provide only micro-scale resolution. The NSF Center for High-rate Nanomanufacturing (CHN) has developed a new fully automated system that uses directed assembly based printing at the nanoscale to make products that fully take advantage of the superior properties of nanomaterials. The Nanoscale Offset Printing System (NanoOPS) can print metals, insulators and semiconductors (including III-V and II-VI), organic and inorganic materials into nanoscale structures and circuits (down to 20 nanometers). The printer has demonstrated many applications such as sesnors, electronics, energy and medical devices. A variety of sensors have been printed, among them a micro biosensor chip capable of detecting multiple biomarkers simultaneously (in vitro and in vivo) with a detection limit that's 200 times lower than current technology. In addition, the center made a printed Band-Aid sensor that could read glucose, urea and lactate levels using sweat or tears. This novel, flexible carbon Nanotube conductance based sensor platform for instantaneous measurement of various pathogens and for monitoring physiological parameters of human body for applications in the wearable health and environmental monitoring. These sensors comprises of highly sensitive and selectively functionalized s-SWCNTs. We show that D-glucose, L-lactate, Urea, E. coli, and Adenovirus were detected with very high sensitivity, selectivity, stability and repeatability. This developed biosensor platform detects D-glucose, L-lactate, Urea, E. coli, and Adenovirus over a wide range in a few seconds making them suitable for many applications.

Biography

Dr. Ahmed A. Busnaina, is the William Lincoln Smith Chair Professor, Distinguished University Professor and founding Director of National Science Foundation's Nanoscale Science and Engineering Center for High-rate Nanomanufacturing and the NSF Center for Nano and Micro-contamination Control at Northeastern University, Boston, MA. Prof. Busnaina is internationally recognized for his work on nano and micro scale defects mitigation and removal in micro and nanofabrication. He specializes in directed assembly of nanoelements and in the nanomanufacturing of micro and nanoscale devices. He developed many manufacturing techniques for nanomaterials based energy, electronics, biomedical and materials applications. His research support exceeds $50 million. He authored more than 600 papers in journals, proceedings and conferences in addition to 25 filed and awarded patents. He is an associate editor of the Journal of Nanoparticle Research. He also serves on many advisory boards including Samsung Electronics. He is a fellow of the American Society of Mechanical Engineers, and the Adhesion Society, a Fulbright Senior Scholar and listed in Who's Who in the World.