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MSEC SEMINAR AND COMMERCIALIZATION FORUM



INVITED SPEAKER:

**DR. JOHN BRUNO**

“DNA APTAMER APPLICATIONS IN DIAGNOSTICS AND THERAPEUTICS ”

**September 28<sup>th</sup>, 2018**

**1:30 – 3:00 PM**

RFM 3241

**Biography:**

Dr. Bruno completed his Ph.D. in Microbiology and Immunology in 1991 at the University of Arizona and his postdoctoral studies with the National Research Council at the former Brooks Air Force Base, TX. He then worked for 3 years at ECBC, Aberdeen Proving Ground, MD and has remained active in chem-bio defense via SBIR and BAA-funded projects ever since. He has worked in the field of aptamers and biosensors for 22 years and was the CSO of Operational Technologies Corp. in San Antonio, TX for 15 years where his division sold DNA aptamers via the internet. He has authored 100 peer-reviewed journal articles, 7 book chapters, and edited a book entitled Biomedical Applications of Aptamers, obtained 16 issued US and EU patents and won a 2011 SBA Tibbetts award for excellence in SBIR-funded aptamer research, development and commercialization as well as Second Place (\$120k in prize money) in the 2015 FDA Food Safety Testing Technology Challenge for Aptamer-based assays and a handheld fluorometer.

**Abstract:**

Aptamers can be thought of as artificial antibodies composed of DNA or RNA. Aptamers are developed by iterative rounds of affinity-based selection and PCR followed by cloning and sequencing (i.e., “SELEX”). Aptamers hold several distinct advantages over antibodies in that they obviate animal hosts (are developed entirely in vitro) and exhibit virtually no batch-to-batch variation once the DNA sequence is known and reproduced by chemical synthesis. Aptamer technology has existed for nearly 30 years, but apprehensions about the original patent, and several key problems with implementing aptamers in diagnostics and therapeutics

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have inhibited commercial adoption of aptamers. Dr. Bruno's group has pioneered and patented several new improvements to aptamer technology including the use of 200 base "multivalent" aptamers for enhanced specificity and affinity or avidity. Bruno's group has developed new types of intrachain aptamer beacons and used aptamers for homogeneous FRET-based detection of bone peptides in urine for astronauts or osteoporosis detection on earth as well as methyl phosphonic acid (core of sarin, soman and VX), botulinum toxins, Bacillus spores, and other bacteria for biodefense and environmental monitoring using a handheld fluorometer. In addition, DNA aptamer-based assays for foodborne, waterborne, and other microbial pathogens using a magnetic bead-based enzyme-linked fluorescence format and aptamer-based lateral flow test strips using colloidal gold or red quantum dots for increased sensitivity have been developed for the USDA. Other assay formats including aptamer-magnetic bead electrochemiluminescence (ECL), surface plasmon resonance (SPR), and LC-mass spectral assays for cardiovascular and cancer biomarkers in serum are being developed for NIH. In addition, prospects for the use of aptamers as antiviral prophylactic or passive immunity treatments and aptamer-3'-Fc or -C1q conjugates as therapeutic antibody surrogates to battle

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