**MIRG Final Report**

* **Project Title**

Flexible, Disposable and Highly Sensitive Biosensor Based on Graphene Field Effect Transistor

* **List of Internal PI/Co-PI**

PI: Dr. Maggie Yihong Chen

Co-PI: Dr. Qingkai Yu

Dr. Shannon Weigum

* **Project Abstract with Results (Please limit to 250 words)**

In this MIRG program, we developed graphene field effect transistors (FETs) fabricated on ﬂexible Kapton substrates using 3-D inkjet printing for use as biosensors to detect infectious organisms. Inkjet printing process of graphene film is optimized with sheet resistance as low as 110 Ω/sq. To suppress background noises, the biosensors are based on intensity changes of the AC signal as a function of the biological agents’ concentration. Using the foodborne pathogen, Norovirus, as a proof-of-concept disease target, the value of S12 (i.e. the voltage gain from source to drain) at 10 GHz generates a linear response from 0.07 dB to 3.70 dB when the concentration of Norovirus protein increases from 0.1 µg/ml to 100 µg/ml. While further studies are needed to improve surface functionalization and sensitivity, the current study establishes a linear response over three orders-of-magnitude indicating that the flexible graphene FET sensor has a wide dynamic range for detection of biological targets that could ultimately be applied for detection of a variety of disease-causing pathogens.

* **List external grants submitted related to the MIRG grant (include agency name, program name, proposal title, amount requested and date submitted.)**

1. 2015 NSF MRI equipment proposal, Yihong Chen (PI), $330,000
2. 2015 DOD HSCU/MI equipment proposal, Yihong Chen (PI), $400,000

* **List any planned external grant submissions related to the MIRG grant**

NSF PD 15-7909, Nano-Biosensing