

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Impedimetric Zika and Dengue Biosensor based on Functionalized Graphene Oxide Wrapped Silica Particles SEON-AH JIN, ERNESTO E. MARINERO, LIA A. STANCIU STANCIU, School of Materials Engineering, Purdue University, USA, SHISHIR POUDYAL, RICHARD J. KUHN, Department of Biological Sciences, Purdue University, USA — A composite of 3-Aminopropyltriethoxysilane (APTES) functionalized graphene oxide (APTES-GO) wrapped on SiO₂ particles (SiO₂@APTES-GO) was prepared via self-assembly. Transmission electron microscopy (TEM) and ATR-Fourier Transform Infrared spectroscopy (ATR-FTIR) confirmed wrapping of the SiO₂ particles by the APTES-GO sheets. An impedimetric biosensor was constructed and used to sensitively detect Zika and dengue DNA and RNA via primer hybridization using different oligonucleotide sequences. The results demonstrate that the SiO₂@APTES-GO electrode materials provide enhanced RNA detection sensitivity with selectivity and detection limit (1 femto-Molar), compared to both APTES-GO and APTES-SiO₂. The three-dimensional structure, higher contact area, electrical properties and the ability for rapid hybridization offered by the SiO₂@APTES-GO resulted in a successful design of a Zika and dengue biosensor with the lowest detection limit reported to date. We are in the process of developing a platform for multiple viral detection for point-of-care diagnostics for arthropode borne viral infectious diseases.

Ernesto Marinero
School of Materials Engineering, Purdue University, USA

Date submitted: 11 Nov 2016

Electronic form version 1.4