Development of a Rapid, Low-Cost Assay Based on ZIKV NS1 Protein Functionalized Gold Nanorods on a Plasmonic Paper Substrate for ZIKV Diagnosis

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The Zika Virus (ZIKV) has recently been a major cause of concern in many parts of the world. ZIKV infections are linked to fetal and newborn microcephaly, a spectrum of abnormalities in the fetal and newborn brain, possible abnormalities in the adult brain with neurological consequences and to Guillain–Barré syndrome. The most major epidemic occurred in South America from early 2015 through late 2016, and still, new cases are being found. Lack of proper healthcare in underdeveloped countries, unsanitary conditions, and most importantly, a lack of precise, rapid, cheap, on site (point-of-care) detection systems have kept the infection spreading and have hindered curbing efforts. This work demonstrates a novel method for detecting the presence of the anti-ZIKV-NS1 antibody in human blood, as this is an effective biomarker for the presence of ZIKV. This method involves plasmonic paper-based detection platform which is cheap, as it uses common filter paper, and rapid, with a detection time of less than 2 hours. The engineered biosensor is quite effective as well, with a detection limit as low as 10 ng/mL of antibody in human serum and 1ng/mL in PB buffer. Most importantly, this method has great potential to be applied for point-of-care applications in detection of ZIKV.

Awards Won:
Third Award of $1,000