

Label-free dengue E protein detection using a functionalized tapered optical fiber sensor

ABSTRACT

The surge of Dengue cases around the globe has intensified the demand for a reliable diagnostic method. The work demonstrates, to the best of our knowledge, the first label-free optical based sensor for detection of Dengue II E proteins. This was achieved by utilizing tapered optical fiber that has been functionalized with complementary recombinant antibodies. The fundamental concept of the sensor relies on the interaction between strong evanescent waves resulting from the dimensional change of the fiber and immune complex formed on the surface of the fiber when the virus is present. Sensitivity and detection limit values obtained with the sensor setup are 5.02 nm/nM and 1 pM, respectively, with a standard deviation value of no more than ± 0.4 . The compact and rapid sensor is a viable alternative for label-free and quantitative assessment of the infection, which may assist in providing better clinical management and understanding of the disease.

Keyword: Dengue E protein; Tapered optical fiber; Dengue sensor; Optical sensor; Fiber optic