

## Abstract

The aim of this project is trying to use glass optical fiber based on surface plasmon resonance (SPR) for detection of the concentrations of glucose solution and glycosylated hemoglobin (HbA1c). For device fabrication, we polished the fiber core and cladding till 31.25 $\mu$ m and then coated a golden thin film of 40nm by sputtering method on the sensing area for plasmon resonance. For the glucose solution detecting, first we use the refractometer to measure the refractive index of different concentrations of glucose liquid at 0%、5%、10%、15% and 20%. The concentration of glucose solution presents linear relationship with its refractive index. Then we use fiber sensor to measure the glucose solution. As a result, the SPR wavelength shift also depends on the concentrations of glucose liquid linearly. In addition, the sensitivity and resolution of the SPR fiber sensor is also calculated as 1255 nm/RIU and  $5 \times 10^{-4}$  RIU, respectively. For HbA1c detecting, we use surface modification method to immobilize DTBA-PBA SAMs on the golden thin film of the sensor to catch HbA1c particularly. Finally, 3% concentration of HbA1c is taken as a sample to verify the feasibility for detection.