

Title: Multi analyte detection based on D-shaped PCF sensor for glucose concentrations sensing

Author: Ammar M. Tuaimah, Shaymaa R. Tahhan, Hanan J. Taher, Kawsar Ahmed & Fahad Ahmed Al-Zahrani

Abstract: In this study, we present a multi-surface plasmon resonance biosensor for detecting refractive index in the near-infrared range that is both straightforward and extremely effective. Titanium dioxide is used to create a thin adhesive coating that is used to firmly bond the gold (Au) layer to the photonic crystal fibers (PCF's) silica surface. A wavelength interrogation maximum sensitivity of 29,162 nm/RIU in the detection region of (1.36954, 1.37639, 1.38324, and 1.39057) and a standard sensitivity of 10,949 nm/RIU are just a few of the amazing performance attributes of the suggested sensor. Additionally, it uses both wavelength interrogation and amplitude techniques to show the highest amplitude sensitivity of 20,134.19 RIU⁻¹ and a theoretical maximum resolution of RIU. These findings appeal that the Multi-PCF surface plasmon resonance sensor has the best sensitivity and resolution yet observed, making it a prime candidate for the detection of organic compounds, biomolecules, chemical analytes, and other substances. The successful results achieved for each tested analyte show our sensor's reliability and robustness.

Keywords: D-shaped photonic crystal fiber (PCF), Refractive index coating, Surface plasmon resonance, Biosensor, Optical sensor

DOI: <https://doi.org/10.1007/s11082-023-05894-3>

<https://link.springer.com/article/10.1007/s11082-023-05894-3>