**ABSTRACT**

In this paper, we theoretically studied the role of the prism material in sensor design of SPR-based sensor. We analysed the performance of three prisms of different refractive indices coated with composites of Indium tin oxide and gold with different thickness values. We studied the reflection spectra under the angular interrogation mode and the performance are evaluated by employing two main parameters such as sensitivity and Full width Half Maximum (FWHM) of resonance curve. It is found that 10% of ITO hosted in metal matrix of gold gives the highest shift (8.14˚) in resonance angle and least FWHM (5.15˚) of the resonance curve for the film thickness of 50nm for the prism of np=1.456.