**ABSTRACT**

 In the recent years, the application of spr based fibre optic sensors have progressed very rapidly. Due to the increase in diseases and diagnotics, the urge for bio sensing applications have drawn the attention of researchers. A detailed numerical analysis on the performance parameter of an optical fibre based SPR sensors with Graphene layers over four different metals Pt/Au/Ag/Cu have been studied. Graphene not only helps in the adsorption of biomolecules due to pi-pi stacking interaction but also prevents metal oxidation. The thickness of the metal layer, its dielectric constants and the thickness, length and refractive index of the sensing layer is properly chosen and the sensitivity evaluation is done. The inclusion of Graphene layer is found to improve the sensitivity of the sensor. The attenuated total internal reflection method along with Krestchmann configuration has been employed for the evaluation. The effects of the metal structures considered and its thicknesses on the transmitted spectrum of the proposed sensor is analysed. Amongst the various chosen combinations, the proposed optimized Platinum Graphene coated SPR sensor demonstrates higher sensitivity than the previously reported spr sensors. The proposed configuration will surely be a promising candidate for high performance bio-sensing applications.