**ABSTRACT**

 Theoretical simulation on the performance of Graphene as single, double and triple layers has been studied. The attenuated total internal reflection method along with Krestchmann configuration has been used to analyze the sensor. The surface Plasmon resonance based fiber optic sensor for three, four and five layer mode (core, single/bi/tri metal layer and sample) were studied theoretically by varying the refractive index of the sample from 1.32 to 1.335 in terms of 0.005. The overall performance parameters of the proposed sensor is studied and analysed.