**ABSTRACT**

 It is observed that plasmonic structure based on (chalcogenide) sulfide glass Ge20Ga5Sb10S65 commonly known as 2S2G allows for a wide range of sensing applications in the infrared wavelength region. In this paper, we theoretically presents an improved sensitive surface plasmon resonance bio sensor using graphene layers on 2S2G prism. The light reflection coupled into a spr mode propagating along metal graphene interface on the 2S2G prism is calculated and compared to a conventional silver based spr bio sensor. This enhancement is due to the pi-stacking interaction between carbon based hexagonal structure of graphene and carbon based ring biomolecules which increases biomolecular adsorption in the graphene layer.