

Effect of III-V Nitrides on Performance of Graphene-Gold SPR Biosensor

Authors : Bijaya Kumar Sahoo

Abstract : The effect of III-V nitride semiconductors on performance of a graphene-on-gold surface plasmon resonance (SPR) biosensor has been investigated theoretically. III-V nitrides (AlN, GaN and InN) have been grown between gold (Au) and graphene layers. The sensitivity and performance of the biosensor have been computed for with and without semiconductors. Due to superior electronic and optical properties, III-V nitrides demonstrate high sensitivity and performance over Si and Ge. The enhancement of evanescent electric field due to III-V nitrides have been computed and found highest for InN. The analysis shows that for a high-sensitive imaging biosensor the required optimal thickness of gold, InN and graphene are respectively 49 nm, 11 nm and 0.34 nm for the light of wavelength =633 nm (red He-Ne laser). This study suggests that InN would be a better choice for fabrication of new imaging SPR biosensors.

Keywords : SPR biosensor, optical properties, III-V nitrides, sensitivity, enhancement of electric field, performance of graphene gold SPR biosensor

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