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Numerical Analysis on a Sensitive Biosensor Based on Metal–Graphene Surface Plasmon Resonance

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In this paper we will report on a study of surface plasmon resonance biosensors. The biosensors consist of a 50 nm metal thin film, with one or more layers of graphene attached to the lower surface. Surface plasmons is excited by an incident transverse magnetic field on the upper surface of the metal. This incident field is considered to be in a glass material and at an angle of incidence that will excite surface plasmons, as in the *Kretschmann configuration*. There is high biomolecule absorption in the graphene and this is shown to lead to a significant enhancement in the sensitivity of the surface plasmon resonance biosensor. In this paper we show, using a computational model, the increase in sensitivity that can be obtained from single and multilayer graphene. In the model we also consider different metal thin films, such as gold, silver and copper. The reflection of visible light coupled into a SPR mode propagating along a thin metal-graphene layer is calculated and compared with a conventional SPR biosensor where there is not a graphene layer present. It is shown that the reflection obtained is strongly dependent upon both the number of graphene layers and the thickness of metal thin film that is used.

| Surface Plasmon Resonance | Graphene | Biosensor |