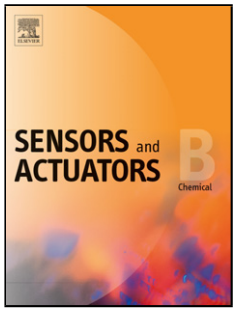

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Sensitivity Enhancement by Air Mediated Graphene Multilayer Based Surface Plasmon Resonance Biosensor for Near Infrared

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Abstract:

Air mediated surface plasmon resonance sensor at near infrared frequency for sensitivity enhancement has been proposed. The proposed sensor utilizes the advantage of air gap between chalcogenide prism and gold film and high adsorption efficiency of graphene for enhancement of sensitivity. The thickness of air and gold film has been optimized for multiple wavelengths. Based on angular interrogation, the sensitivity of the proposed sensor can be tuned by changing the wavelength of operation in near IR and by judiciously selecting number of graphene layer. The sensitivity of the proposed sensor is 43.18º/RIU for 10 graphene layer at 700 nm where as at 1000 nm, the sensitivity is 36.14º/RIU for same number of graphene layer. We found that the sensitivity of the sensor increases linearly with sensing layer refractive index and number of graphene layer at a given wavelength. Also, we found that the detection accuracy of the proposed sensor in near IR increases by more than 290 % for L=10 as compared to conventional SPR sensor. We believe that the proposed sensor could potentially open a new possibility for high performance SPR sensing.

Keywords: Surface plasmon resonance, Biosensor, Sensitivity, Detection accuracy, Chalcogenide prism, Graphene