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Graphene Coated Optical Fiber SPR Biosensor

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In this study, graphene, the most attractive material today, has been applied to the wavelength-modulated surface plasmon resonance (SPR) sensor. The optical fiber sensor technology is the most fascinating topic because of its several benefits. In addition to this, the SPR phenomenon enables the detection of biomaterials to be label-free, highly sensitive, and accurate. Therefore, the optical fiber SPR sensor has powerful advantages to detect biomaterials. Meanwhile, Graphene shows superior mechanical, electrical, and optical characteristics, so that it has tremendous potential to be applied to any applications. Especially, grapheme has tighter confinement plasmon and relatively long propagation distances, so that it can enhance the light-matter interactions (F. H. L. Koppens, et al., Nano Lett., 2011). Accordingly, we coated graphene on the optical fiber probe which we fabricated to compose the wavelength-modulated SPR sensor (Figure 1.). The graphene film was synthesized via thermal chemical vapor deposition (CVD) process. Synthesized graphene was transferred on the core exposed region of fiber optic by lift-off method. Detected analytes were biotinylated double cross-over DNA structure (DXB) and Streptavidin (SA) as the ligand-receptor binding model. The preliminary results showed the SPR signal shifts for the DXB and SA binding rather than the concentration change.

Keywords: Graphene, optical fiber sensor, surface plasmon resonance, double cross-over DNA, Streptavidin