**Gold Nanostructures/Graphene nanosheets modified ITO substrate for enhance Non-enzymatic Detection of Glucose in Serum based on Surface-Enhanced Raman Spectroscopy**

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Diabetes mellitus is a worldwide public health problem, in 2000 WHO has been reported that at least 171 million people worldwide suffer from diabetes. The metabolic disorder could be reflected by the variations of the glucose concentration from the normal range (4.4–6.6mM). Therefore, the determination of glucose concentration is a very important issue in clinic for diagnosing diabetics. Numerous studies have been performed toward developing a real-time, quantitative, and biocompatible glucose biosensor. Several electrochemical techniques based on glucose oxidase enzyme were used successfully for oxidation of glucose. However, these indirect detection methods are disadvantaged because this enzyme needs to be replenished limiting the lifetime of the sensor. Moreover, developed of non-invasive measurement of blood glucose by various methods including optical spectroscopy techniques have remained an elusive target for more than two decades. Here, we demonstrated a simple, rapid and inexpensive fabrication method to develop gold nanostructures/graphene nanosheets modified ITO substrate and its application as a glucose enzyme-free optical biosensor with high sensitivity and selectivity. This Au nanodots/graphene modified ITO substrate was developed based on electrochemical deposition of Au and graphene onto ITO substrate layer-by-layer. This modified transparent substrate was successfully used to measure glucose concentrations within range from 500 nM to 10 mM by surface enhanced Raman spectroscopy. Moreover, the need to achieve accurate non-invasive measurements of glucose under the presence of other possible blood analytes leads us to apply this substrate to monitoring the glucose level in the presence of human serum. Our results demonstrated an efficient direct measurement of near-physiological level of glucose. The optimization of such system will open the possibility of using this modified substrate as an optical biosensor for the *in-vivo*, non-invasive and on-line monitoring of glucose.

**References**

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