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Ultrasensitive Immunosensing Platform Based on Analyte Induced Disruption of Luminescence Quenching (AIDLuQ)

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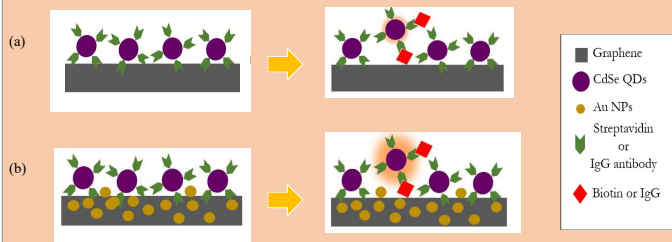
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ABSTRACT

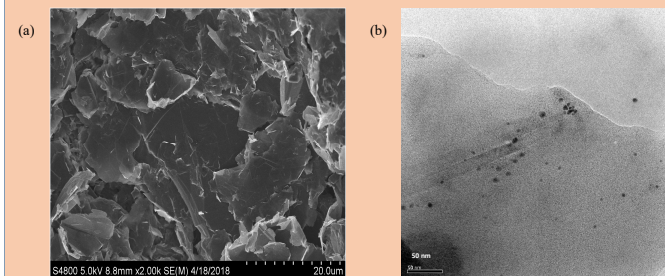
In this study, we design an extremely fast and sensitive immunosensing platform using graphene as the sensing platform. A solution containing a mixture of graphene nanoplatelets and gold nanoparticles was coated on to a copier paper using a spray gun to form a uniform coating. Fluorescent quantum dots (QDs) functionalized with antibodies (Ab) were drop casted on to this platform, whose fluorescence was quenched by the graphene on the graphene/gold paper. With the addition of the antigen to this graphene/gold-QD-Ab complex, a disruption of quenching was observed, and the fluorescence intensity increased with increasing concentration of the antigen. A detection limit of as low as 10 fM was obtained for the detection of human Immunoglobulin G (IgG).

EXPERIMENTAL PROCEDURE



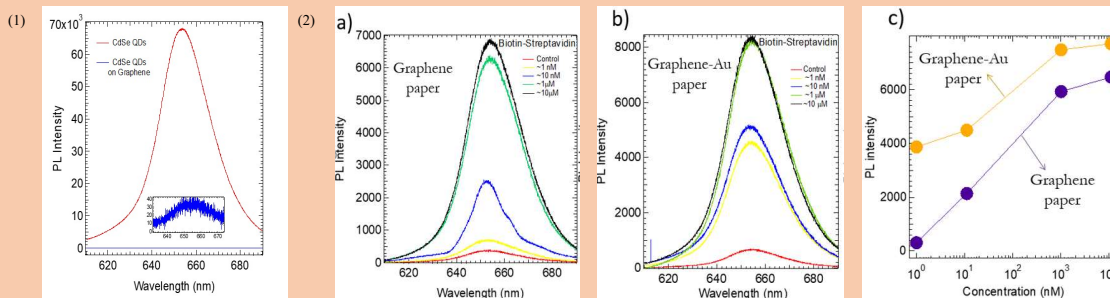
Schematic of AIDLuQ on (a) Graphene paper and (b) Graphene (Au) paper

SEM/TEM IMAGES



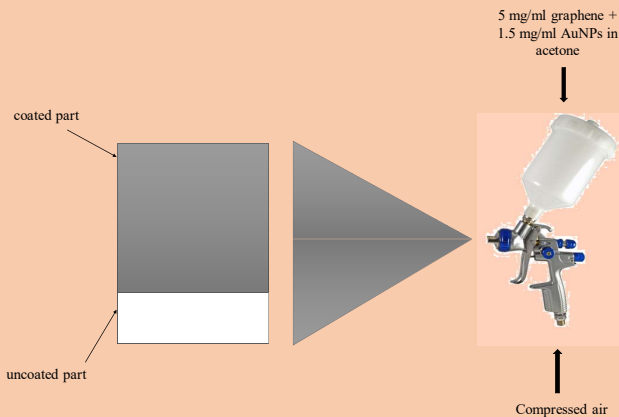
(a) SEM image of Graphene Paper and (b) TEM image of Graphene (Au) Paper

PRELIMINARY STUDY: HIGHER CONCENTRATIONS

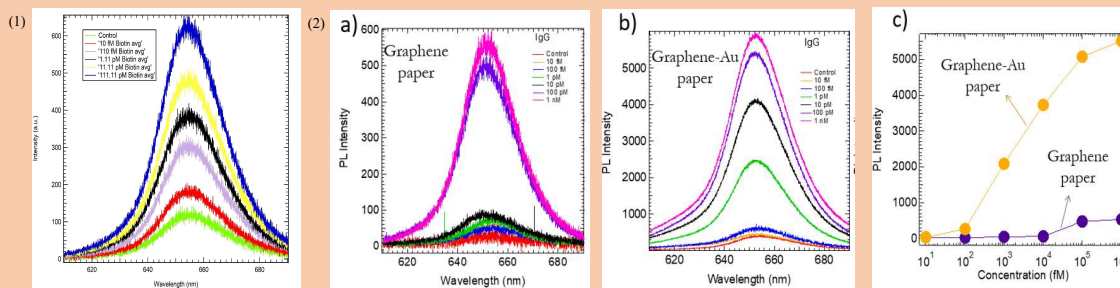


(1) Quenching of Fluorescence in Graphene-paper; (2) PL intensities of Biotin-Streptavidin study on (a) Graphene paper, (b) Graphene (Au) paper, and (c) as a function of concentration

PREPARATION OF SENSING PLATFORM



LOW CONCENTRATION SENSING STUDY



(1) Low Concentration Biotin-Streptavidin Study; (2) PL intensities of IgG study on (a) Graphene paper, (b) Graphene (Au) paper, and (c) as a function of concentration