Optical biosensors based on graphene

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Abstract

Since graphene bears innovative mechanical, electrical, thermal and optical properties, this two-dimensional material is under active research [1–7]. In this regard, graphene displays advantageous characteristics to be used in biosensing platforms owing to the excellent capabilities for direct wiring with biomolecules, heterogeneous chemical and electronic structure, the possibility to be processed in solution and the availability to be tuned as insulator, semiconductor or semi-metal [3,6,8,9]. Moreover, after oxidation treatments, graphene can exhibit an interesting photoluminescence property in relation to resonance energy transfer donor/acceptor molecules exposed in a high planar surface and even can be proposed as a highly efficient quencher, which is opening the way to new biosensing strategies. We will discuss some exploitable properties of graphene in optical biosensig and our experimental results of the excellent capabilities of oxidized graphene as fluorescence quencher in order to be employed in biosensing applications. Graphene based optical biosensing platforms are versatile in configurations in addition of being highly sensitive, robust enough beside offering interesting multidetection capabilities in association to other nanomaterials (i.e. quantum dots). The preliminary results obtained so far seems to be with interest for future applications such as diagnostics (biomarkes detection) or safety and security applications (i.e. bacteria).

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