

Fluorescence Quenching as an Efficient Tool for Sensing Application: Study on the Fluorescence Quenching of Naphthalimide Dye by Graphene Oxide

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Abstract : Recently, graphene has gained much attention because of its unique optical, mechanical, electrical, and thermal properties. Graphene has been used as a key material in the technological applications in various areas such as sensors, drug delivery, super capacitors, transparent conductor, and solar cell. It has a superior quenching efficiency for various fluorophores. Based on these unique properties, the optical sensors with graphene materials as the energy acceptors have demonstrated great success in recent years. During quenching, the emission of a fluorophore is perturbed by a quencher which can be a substrate or biomolecule, and due to this phenomenon, fluorophore-quencher has been used for selective detection of target molecules. Among fluorescence dyes, 1,8-naphthalimide is well known for its typical intramolecular charge transfer (ICT) and photo-induced charge transfer (PET) fluorophore, strong absorption and emission in the visible region, high photo stability, and large Stokes shift. Derivatives of 1,8-naphthalimides have found applications in some areas, especially fluorescence sensors. Herein, the fluorescence quenching of graphene oxide has been carried out on a naphthalimide dye as a fluorescent probe model. The quenching ability of graphene oxide on naphthalimide dye was studied by UV-VIS and fluorescence spectroscopy. This study showed that graphene is an efficient quencher for fluorescent dyes. Therefore, it can be used as a suitable candidate sensing platform. To the best of our knowledge, studies on the quenching and absorption of naphthalimide dyes by graphene oxide are rare.

Keywords : fluorescence, graphene oxide, naphthalimide dye, quenching

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