GRAPHENE OXIDE AS AN EFFICIENT QUENCHER FOR THE FLUORESCENCE OF AMINO ACIDS, PEPTIDES, AND PROTEINS

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Graphene oxide (GO) is a two-dimensional carbon nanomaterial featuring carboxylic acid groups at the edges, phenol hydroxyl and epoxide groups mainly at the basal plane, and some intact carbon-carbon sp^2 domains. Recently, GO has attracted tremendous interest for its potential biological and biomedical applications, such as cellular imaging, drug delivery and biosensors. However, one critical question has to be addressed before any actual application: how GO interacts with amino acids, peptides and proteins. Herein, we report that GO has high capacity to quench the fluorescent amino acids (tyrosine and tryptophan), peptides (human insulin and human amylin) and proteins (bovine serum albumin and human serum albumin) by adsorption through non-covalent interactions. The mechanism of quenching is determined as a dynamic and static combined mechanism without any fluorescence resonance energy transfer (FRET). A “sandwich” model based on the quenching data is proposed for the GO-tyrosine or GO-tryptophan complexation during static quenching.