Title

GRAHENE OXIDES SUPPRESSING THE REACTIVE OXYGEN SPECIES GENERATED BY PHTHALOCYANINE

Abstract

In this contribution we evaluate the viability of graphene oxides as platforms for delivering photosensitizers in photodynamic therapy (PDT) applications with chloroaluminum phthalocyanine (ClAlPc). Different types of graphene oxides: graphene oxide (GO), reduced graphene oxide (RGO), and carboxylated nano graphene oxide (NGO) were mixed in different proportions with ClAlPc. The amount of ROS generated by each formulation, after being irradiated by 660 nm laser, was measured by electron paramagnetic resonance (EPR) spectroscopy, using the CMH spin probe. In addition, samples were characterized by steady-state absorption/emission and time-resolved emission spectroscopies. Plain ClAlPc solutions generated a large amount of ROS after undergoing 660 nm light irradiation, which scaled linearly (R^2= 0.988) with its concentration. However, in the presence of graphene oxides, the ROS generation is suppressed in following order: GO<NGO<RGO. Data from absorption/emission spectroscopies revealed that graphene oxides and ClAlPc form non-emissive supramolecular complexes via pi-stacking interactions. The excited state life-time of free ClAlPc was about 9 ns and decreased to 7 ns after mixing with the graphenes, showing a typical static quenching. All these effects occurred even when graphenes were previously functionalized with pluronic. Since these effects occur, graphene oxides/ClAlPc are not suitable platforms for PDT applications, unless a proper encapsulation procedure is developed.