

Recent Advances on Graphene Quantum Dots as Multifunctional Nanoplatforms for Cancer Treatment

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Abstract

Graphene quantum dots (GQDs), the latest member of graphene family, have attracted outstanding interest in the last few years, due to their outstanding physical, chemical, electrical, optical and biological properties. Their strong size-dependent photoluminescence (PL) and the presence of many reactive groups on the graphene surface allow their multimodal conjugation with therapeutic agents, targeting ligands, polymers, light responsive agents, fluorescent dyes, and functional nanoparticles, making them valuable agents for cancer diagnosis and treatment. In this review, the very recent advances covering the last three years on the applications of GQDs as drug delivery systems (DDS) and theranostic tools for anticancer therapy are discussed, highlighting the relevant factors which regulate their biocompatibility. Among these factors, the size, kind and degree of surface functionalization have shown to greatly affect their use in biological systems. Toxicity issues, which still represent an open challenge for the clinical development of GQDs based therapeutic agents, are also discussed at cellular and animal levels.

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