

A review on characterizations and biocompatibility of functionalized carbon nanotubes in drug delivery design

Abstract

The revolutionary development of functionalized carbon nanotubes (f-CNTs) for applications in nanomedicine has emerged as one of the most interesting fields, which has increased exponentially in recent years. This is due to their appealing physical and chemical properties, as well as their unique architecture. After a brief introduction on the physicochemical properties of carbon nanotubes (CNTs), we described several functionalization methods for the surface modification of CNTs, with the aim to facilitate their solubility in physiological aqueous environment. This review focuses on recent advances in drug delivery design based on f-CNTs with an emphasis on the determination of various parameters involved and characterization methods used in order to achieve higher therapeutic efficacy of targeted drug delivery. In particular, we will highlight a variety of different analytical techniques which can be used to characterize the elemental composition, chemical structure, and functional groups introduced onto the CNTs after surface modification. We also review the current progress of available in vitro biocompatibility assays based on f-CNTs and then discuss their toxicological profile and biodistribution for advanced drug delivery.

Keyword: Carbon nanotubes; Nanomedicine; Drug delivery design