Nanomedicine & Biotherapeutic Discovery

Extended Abstract

Magnetic CNTs for selective ablation of cancer cells

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Abstract

The magnetic fluid hyperthermia can be efficient in treating patients with cancer assuming that the magnetic fluid being a colloidal suspension of magnetic nanoparticles is selectively delivered to the tumor site. By exposing the carried particles to the alternating magnetic field heat energy would be dissipated by the carriers, causing the temperature rise in the tumor's close vicinity making its ablation. The healthy cells can survive temperatures up to 42 °C, but cancer cells undergo apoptosis in therapeutic temperatures of 42-45 °C. Carbon nanotubes (CNTs) are capable of absorbing part of the magnetic field radiation due to van Hove singularities but more effective is to fill them with iron atoms. In this paper we present the results of applying highly Fe doped CNTs as the carriers suspended in buffer fluid creating all together a ferro-fluid. However in between the carbon atoms of CNTs strong van der Waals forces appear. They are the main reason for CNTs' aggregations in suspensions to occur. Therefore, dispersing CNTs is incredibly challenging. In our case the CNTs were dispersed solely in gelatine or in gelatine with SDS (sodium dodecyl sulfate). The fluid was subjected to hyperthermia heating, as well, to simulate the reaction of magnetic CNTs in an alternating magnetic field of radio frequency. The temperature growth characteristic curves will be presented and discussed. The tests performed on CNTs ferronanofluids have shown that it is possible to obtain required heat dissipation in cancer cells.

Carbon nanotubes (CNTs) are tubes made from carbon with diameters generally measured in nanometers. Carbon nanotubes typically check with single-wall carbon nanotubes (SWCNTs) with diameters within the vary of a metric linear unit. Single-wall carbon nanotubes ar one among the allotropes of carbon, intermediate between atomic number 6 cages and flat graphene. Though not created this manner, single-wall carbon nanotubes may be perfect as cutouts from a two-dimensional hexangular lattice of carbon atoms rolled up on one among the Bravais lattice vectors of the hexangular lattice to create a hollow cylinder. During this construction, periodic boundary conditions are obligatory over the length of this roll-up vector to yield a spiraling lattice of seamlessly secured carbon atoms on the cylinder surface. Carbon nanotubes conjointly typically check with multi-wall carbon nanotubes (MWCNTs) consisting of nested single-wall carbon nanotubes infirm certain along by van der Waals interactions during a tree ring-like structure. If not identical, these tubes are terribly kind of like Oberlin, Endo, and Koyama's long straight and parallel carbon layers cylindrically organized around a hollow tube. Multi-wall carbon nanotubes also are typically wont to check with double- and triple-wall carbon nanotubes. Carbon nanotubes may also check with tubes with an undetermined carbon-wall structure and diameters but a hundred nanometers. Such tubes were discovered in 1952 by Radushkevich and Lukyanovich. Whereas nanotubes of alternative compositions exist, most analysis has been targeted on the carbon ones. Therefore, the "carbon" qualifier is usually left underlying the acronyms, and therefore the names are abbreviated NGO, SWNT, and MWNT. The length of a nanotube made by common production ways is usually not rumored, however is usually a lot of larger than its diameter. Thus, for several functions, finish effects are neglected and therefore the length of carbon nanotubes is assumed infinite. Carbon nanotubes will exhibit outstanding electrical physical phenomenon, whereas others are semiconductors. They even have exceptional durability and thermal physical phenomenon owing to their nanostructure and strength of the bonds between carbon atoms. Additionally, they will be with chemicals changed. These properties are expected to be valuable in several areas of technology, like natural philosophy, optics, composite materials (replacing or complementing carbon fibers), applied science, and alternative applications of materials science. Rolling up a hexangular lattice on totally directions to create different infinitely long single-wall carbon nanotubes shows that every one of those tubes not solely have spiraling however conjointly change of location symmetry on

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the tube axis and lots of even have nontrivial move symmetry concerning this axis. Additionally, most are chiral that means the tube and its similitude can't be superimposed. This construction conjointly permits single-wall carbon nanotubes to be labelled by a combine of integers.

A special cluster of achiral single-wall carbon nanotubes are golden, however all the remainder ar either tiny or moderate band gap semiconductors. These electrical properties, however, don't rely upon whether or not the hexangular lattice is rolled from its back to front or from its front to back and therefore are an equivalent for the tube and its similitude.

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