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Editorial

Applications of Biomedical Nanotubes

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EDITORIAL

Novel biomaterials for diagnostics and therapeutics of biomedical issues have been considered using biomedical science and health care. Halloysite nanotubes (HNTs) are naturally occurring alumino silicate clay. Because of their unique hollow tubular structure, biodegradability, mechanical and surface properties, they have drawn the attention of researchers to a variety of biomedical applications. HNTs are inorganic natural alumino silicates that are tubular-shaped and Nano sized. These are well-known Nano fillers and Nano containers used to develop composites for various biomedical applications to load bioactive molecules and therapeutic agents. HNTs-polymer Nano composites, their characterizations, properties, and applications in biomedical fields are all covered in this review paper. The current article provides an overview of HNTs and their applications in medical and biomedical settings, focusing on individualized HNTs and drug loading methods and biomedical applications, which may aid researchers in developing novel biomaterials for biomedical engineering and health care. Nanotechnology is an advanced research area with numerous applications in science and technology, and other fields. This field has a bright future ahead of it, with wide-ranging research done to expand the range of its applications. Halloysite nanotubes are Nano with various functions that can be found in abundance in nature as mineral clay. These mesoporous tubular particulates have significant adsorption and loading capacities. These are made from geologically rolled alternative silica layers and alumina. These materials, which include cellulose, lignin, and starch, have gradually replaced traditional petroleum-based materials. HNTs as fillers have become essential components in most synthetic elastomers. Structure Nano fillers, size, specific surface area, and surface groups are important factors. The Nano sized, green, and inorganic nature of HNTs makes them different from many other materials. Nano composite materials and polymeric composites are synthesized from HNTs due to several available functional groups. These synthesized materials are antibacterial, biocompatible, nontoxic, hemocompatible, and sustained release of therapeutic agents in biomaterial engineering. Moreover, polymer matrices could act as a reservoir for drugs. Thus, as the polymer degrades, the drugs can be released. Likewise, the polymers' low cost, soft, ductile, biodegradable, and biocompatible properties put it as the material of choice. As a result, HNT-based composites are becoming potential materials for advanced research to develop biomaterials such as drug delivery vehicles in Nano medicine. Its nanocomposites for implants and scaffolds, surgical instruments and fixtures, and therapeutic medications due to their outstanding properties. This review highlights the findings that can be used to determine the potential of HNTs in biomedical applications using various polymer matrices. This comprehensive article will discuss HNT for biomedical applications and its drug loading methods and focus on numerous studies of HNT polymer composites in medicine and health care delivery. The vial suspension is shifted to vacuum-jar to make a homogeneous mixture from the suspension by evacuating several times via vacuum pump. During vacuum, a minor solution fizzing is a sign of lumen air removed from suspended HNTs. The suspending media should be remained under vacuum for 10–30 min before being returned to atmospheric pressure to replace the removed air with the desired molecules. To ensure that the lumen is filled with the molecule solution, this process is repeated two to four times. Meanwhile, the targeted bioactive molecules are mixed in equal parts by weight with HNT in the second method. Instead of dispersion, the resultant mixture in this method is a thick paste. Two to three times, the mixture is cycled between vacuum and atmospheric pressure.

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