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PUBLISHED ARTICLE

Potential and prospective implementation of carbon nanotubes on next generation aircraft and space vehicles: A review of current and expected applications in aerospace sciences

Abstract

Carbon nanotubes have instigated the interest of many different scientific fields since their authenticated introduction, more than two decades ago. Particularly in aerospace applications, the potential implementations of these advanced materials have been predicted to have a large impact on future aircraft and space vehicles, mainly due to their distinct features, which include superior mechanical, thermal and electrical properties. This article provides the very first consolidated review of the imminent prospects of utilizing carbon nanotubes and nanoparticles in aerospace sciences, based on their recent implementations and predicted future applications. Explicitly, expected carbon nanotube employment in aeronautics and astronautics are identified for commercial aircraft, military aircraft, rotorcraft, unmanned aerial vehicles, satellites, and space launch vehicles. Attention is devoted to future utilization of carbon nanotubes, which may comprise hydrogen storage encapsulation, composite material implementation, lightning protection for aircraft, aircraft icing mitigation, reduced weight of airframes/satellites, and alleviation of challenges related to future space launch. This study further sheds light onto recent actualized implementation of carbon nanotubes in aerospace applications, as well as current and prospective challenges related to their usage in aerospace sciences, encompassing health and safety hazards, large scale manufacturing, achievement of optimum properties, recycling, and environmental impacts.

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