National Aeronautics and
Space Administration

Materials and Coatings

Thermally Stable Nanocomposites with Aligned Carbon Nanotubes

A method for producing mechanically strong, thermally stable and electrically conductive nanocomposites

NASA Langley Research Center has developed a method for producing multifunctional structural thermally stable nanocomposites with aligned carbon nanotubes. The invention improves upon current state-of-the-art graphite fiber composites by providing the same lightweight and mechanically strong characteristics, but also adds thermal stability and electrical conductivity. Thus, the invention can be used to provide a new class of mechanically strong, thermally stable and electrically conductive nanocomposites.

BENEFITS

- Lightweight
- Mechanically strong
- Tailorable thermally and electrically conductivity
- Can be used in high temperature applications

APPLICATIONS

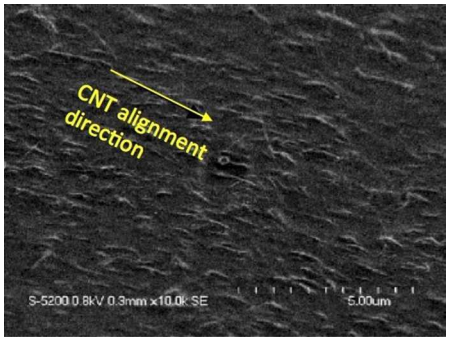
- Automobiles
- Launch vehicles
- Advanced aerospace vehicles
- Aircraft
- Spacecraft

technology solution

THE TECHNOLOGY

Current state-of-the-art for lightweight and mechanically strong composites are graphite fiber composites. While graphite fibers have excellent mechanical properties, they do not have the desired thermal or electrical conductivities. Accordingly, when graphite fiber composites are to be used in high temperature environments, specialized high temperature or thermally conductive coatings are applied to the structure. These extra coatings add weight and cost to the ultimate structure.

This invention, by way of nanocomposites with carbon nanotubes (CNTs), provides the lightweight mechanical strength of graphite fiber composites, but is also thermally stable and electrically conductive. The nanocomposite structure is a polymer in an extruded shape with carbon nanotubes (CNTs) longitudinally algined and dispersed in the extruded shape along a dimension. The polymer is characteristically defined as having a viscosity of at least approximately 100,000 poise at a temperature of 200 C.



High Resolution Scanning Electron Micrograph (HRSEM) of exposed aligned CNT of an extruded SWCNT/polymer composite fiber.

PUBLICATIONS

Patent No: 8,608,993

More Information

National Aeronautics and Space Administration

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