MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Poster Session (P)

Author: Dr. Sohaib Akbar
SUPARCO, Pakistan

Dr. Muhammad Muddassir
Institute of Composite Materials, Technical University Kaiserslautern, Germany, Germany
Mr. Abul Khair Muhammad Shafaat Ali
Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), Pakistan
Mr. Mateen Tariq
SUPARCO, Pakistan
Mr. Ahmad Bashir
Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), Pakistan

NANOCOMPOSITES FOR EMI SHIELDING: A COMPARATIVE STUDY OF EMI SHIELDING PROPERTIES OF CARBON FILLERS, AND MULTI-WALLED CARBON NANOTUBE FILLED POLYMER COMPOSITES

Abstract

Progress in the engineering of antennas and electromagnetic shielding systems depends crucially on the development of materials absorbing/reflecting electromagnetic radiation in a broad range, from meter to millimeter waves. The high reflectance of such materials must be combined with sufficient absorbance in the same frequency range. For specific purpose, the electromagnetic characteristics of these composites may be tailored making them Electromagnetic waves absorbing and reflecting structures. These structures offer good mechanical properties, absorption characteristics and less interference with external profile making them viable for aerospace structure designs. One of the major aspects of EM waves absorbing/reflecting materials manufacturing is the uses in aerospace industry as electronics enclosures for housing sensitive electronic devices. Moreover in the field of electronics and telecommunication these types of material find a wide application in reducing electromagnetic interference (EMI) effects. These materials are electrical lossy materials and hence abolish the electrical component of electromagnetic wave and consequently the whole wave is attenuated. Composite materials consisting of a polymer binder and conductive filler are the most widely used dielectric composites. Typically fillers are graphite, fullerenes, metals, metal oxides and semiconductors. The research is based to establish a structure which is capable of absorbing radio waves, while surplus reflection. Metals being a natural reflector material are suitable choice for EMI shielded enclosures. Their high weight compared to composites limits them for air-Bourne applications. For these applications composites may be developed for manufacturing of EMI shielded enclosure for housing sensitive systems. Composites may be tailored in different way in order to achieve better properties. Carbon fillers may be incorporated in composites for achieving reflection and absorption. These fillers may include Carbon nanotubes, short carbon fibre, Conductive carbon powder and fibres such as Carbon for reflection. By incorporating conductive filler material in composites, they may act as absorbing medium by utilizing the concept of artificial dielectrics.

The objective for this research work is: i) comparative study of various tailored materials for EMI shielding effectiveness; ii) at least 10 percent lighter than conventional materials; iii) manufacturing technique refinement for easy processing.

Potential applications for this invention include principally: Aerospace and satellites, naval vessels, medical equipment, telecommunications and antenna systems, sensitive electronic devices, EMI-shielded

gaskets.

Sheets of paper or fabric made from carbon nanotubes could prove useful for allowing satellites to safely manage static electricity while in space, particularly because there is no way to provide electrical grounding once they're in orbit.