

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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SELF SENSING MULTIFUNCTIONAL COMPOSITE MATERIAL FOR AEROSPACE
APPLICATIONS

Abstract

Multifunctional materials have been of interest to the aerospace community for their potential to reduce cost and improve the integrity of spacecraft operation. The NASA Technology Roadmaps have inspired our group to begin development on a multifunctional composite that can provide state-of-stress data for detecting Micrometeoroids and Orbital Debris (MMOD). This research reports the potential of a layered material architecture capable of sensing along with other desirable characteristics of an efficient space structure. Our goal is focused on investigating the sensory aspect of a bio-inspired, carbon nanotube (CNT), composite that exhibits transduction through free charge carriers. This material architecture is predicated on the phenomenon of flow induced voltage generation observed in CNTs using polar liquids. We address the material selection and properties of said material that demonstrates flow induced voltage on the micron scale. Aerospace structures, pressure vessels and other sub-components might benefit from such a material that can report real time state-of-stress data.