

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advanced Materials and Structures for High Temperature Applications (4)

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KEYNOTE: PAOLO SANTINI MEMORIAL LECTURE MATERIALS AND STRUCTURES
TECHNOLOGY INSERTION INTO SPACECRAFT SYSTEMS: SUCCESSES AND CHALLENGES

Abstract

Over the last 25 years, there have been significant advancements in the field of advanced composites, nanotechnology, additive manufacturing, and multifunctional materials and structures technologies. Of these technologies, advanced polymer composites are being extensively used to fabricate spacecraft bus structures. Multifunctional materials and structures incorporating other non-structural functions such as thermal, electrical, radiation shielding, power, and sensors have been investigated to develop an integrated structure which offers reduced mass, packaging volume, and ease of integration. Combining the advancements in composites, nanotechnology, additive manufacturing, and adaptive structures technologies offers an opportunity to develop innovative multifunctional materials and structures designs. Next generation of spacecraft structures could easily benefit from the best attributes of composites, nanotechnology, additive manufacturing. While, ongoing technology development efforts in nanotechnology, and additive manufacturing offer unique opportunities to develop innovative multifunctional materials and structures designs, they also offer significant challenges in the qualification and acceptance into spacecraft systems. This paper presents a brief overview of the technology development and successful insertion of advanced material technologies into spacecraft structures, and discusses the opportunities and challenges to develop and mature next generation multifunctional materials and structures.