

Development and characterization of composites and nanocomposite for space applications and thermal protection.

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During last decades, a huge variety of Thermal Protection System (TPS) materials have been developed and optimized for different aerospace applications. Carbon/Phenolic Composites (CPCs) are used to manufacture many portions of the nozzle assembly of Solid Rocket Motors (SRMs) which are crucial both to preserve the independent access to space as well as for the homeland security. Similarly, CPCs are also used to produce the heat shields which protect spacecrafts during the flight through an atmosphere or the leading edges of hypersonic vehicles [1]. Other TPS materials for Solid rocket motors are Elastomeric Heat Shielding Materials (which are used at the interface the motor case and the propellant grain [1] whilst, Carbon/Carbon Composite (CCC) are used in the throat of SRMs which is exposed to the harshest conditions generated by modern propellants.

This work presents the results obtained in the development of different thermal protection systems from nanostructured ablators to Carbon phenolic Composites, based on PAN CFs. having performances close to the Rayon based ones. The utilization of nanofillers to improve the thermal resistant properties of the relative composites will also be presented.