

Low Density Flexible Carbon Phenolic Ablators

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Phenolic Impregnated Carbon Ablator (PICA) was the enabling TPS material for the Stardust mission where it was used as a single piece heatshield. PICA has the advantages of low density ($\sim 0.27\text{g/cm}^3$) coupled with efficient ablative capability at high heat fluxes. Under the Orion program, PICA was also shown to be capable of both ISS and lunar return missions; however some unresolved issues remain for its application in a tiled configuration for the Orion-specific design. In particular, the problem of developing an appropriate gap filler resulted in the Orion program selecting AVCOAT as the primary heatshield material over PICA. We are currently looking at alternative architectures to yield flexible and more conformal carbon phenolic materials with comparable densities to PICA that will address some of the design issues faced in the application of a tiled PICA heat shield. These new materials are viable TPS candidates for upcoming NASA missions and as material candidates for private sector Commercial Orbital Transportation Services (COTS). This presentation will discuss flexible alternatives to PICA and include preliminary mechanical and thermal properties as well as arc jet and LHMEI screening test results.