RHEOLOGICAL BEHAVIOR OF PHENOLIC RESINS CONSIDERED FOR PRODUCTION OF CBCF INSULATION

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Abstract

A unique Carbon Bonded Carbon Fiber (CBCF) insulation was developed to provide thermal protection to the isotopic fuel in Radioisotope Power Systems in the unlikely event of reentry. CBCF insulation is made from chopped and carbonized rayon fibers bonded at intersections by carbonized phenolic resin. The rheological behavior of several resins was investigated to determine if alternative resins would be more effective in forming carbon-bond precursors.

The specific phenolic resins investigated in this study include several novolac resins containing different concentrations of crosslinking agent and two resole type resins. Strain-controlled viscosity characterization of each resin was performed using an Advanced Rheometric Expansion System (ARES). Hot stage microscopic examination revealed the physical nature of fiber-resin interaction during the melt, flow and cure of the phenolic resins. The results of this investigation are providing direction for improving bonding within the CBCF microstructure.

Keywords: Carbon Bonded Carbon Fiber, CBCF, Rayon Fiber, Phenolic Resin