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## Multi-Layer Aerogel Insulation for Cryogenic Applications

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Aspen Aerogels, Inc. validated the key process step for a next generation aerogel manufacturing technology to enable the fabrication of thin, low density aerogel materials. When the thin aerogel is stacked with reflector layers to form an aerogel based insulation system, called Multi-Layer Aerogel Insulation (MLAI), it provides thermal performance advantages compared to incumbent insulation systems. Thermal performance testing was performed on various aerogel-based systems at cryogenic temperatures across a vacuum range from 10-5 to 760 torr by the Cryogenics Test Laboratory at NASA Kennedy Space Center to select the optimized aerogel insulation system for prototype development and testing. System-level cryogenic testing at Ball Aerospace & Technologies will also be presented. Like other aerogel systems, this breakthrough thermal insulation is also found to be much more durable and consistent than traditional multi-layer insulation, keeping costs down by minimizing/eliminating rework.

**Primary author:** Dr WHITE, Shannon (Aspen Aerogels, Inc.)

**Co-authors:** Dr MIHALCIK, David (Aspen Aerogels, Inc.); MILLS, Gary (Ball Aerospace & Technologies Corporation); FESMIRE, James (NASA Kennedy Space Center, Cryogenics Test Laboratory); KERCE, Johnny (Vencore, Cryogenics Test Laboratory); BUCHANAN, Leslie (Ball Aerospace & Technologies Corporation); Dr BEGAG, Redouane (Aspen Aerogels, Inc.); BUERGER, Steve (Ball Aerospace & Technologies Corporation)

**Presenter:** Dr WHITE, Shannon (Aspen Aerogels, Inc.)

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