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# M1Po2D-03 [46]: Cryogenic Thermal Conductivity Measurements of 3D Printed Polymer Materials

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Additive manufacturing in industrial and commercial applications has drastically changed manufacturing capabilities while expanding the materials available to cryogenic engineers. Unfortunately, the thermal properties of 3D printed materials and filled materials are not well characterized, especially at cryogenic temperatures. To fill gaps in the literature, an experimental system was developed to measure the thermal conductivity of solids at cryogenic temperatures utilizing the Guarded-Comparative-Longitudinal Heat Flow Technique. The experimental apparatus is incorporated into a high-vacuum cryostat and tuned for insulating materials with thermal conductivities ranging from 0.01 W/m-K to 1 W/m-K. Results of thermal conductivity measurements of selective laser sintered nylon blends and polyimide insulation are presented for temperatures between 30 K and 170 K. Comparisons are made to traditional forms of the materials.

**Primary authors:** RICHARDSON, Ian (Washington State University); ADAM, Patrick (HYdrogen Properties for Energy Research (HYPER) Laboratory, Washington State University); LEACHMAN, Jacob (Washington State University)

**Presenter:** RICHARDSON, Ian (Washington State University)

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