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Performance of Cryogenic Thermal Insulation Materials under Liquid Hydrogen Environment

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Many researchers have studied performance of cryogenic thermal insulation materials with various cryogenic liquids. However, there are not many cases under liquid hydrogen environment. KIST has been operating a 1 L/hr scale hydrogen liquefaction and storage facility since 2013. The KIST liquid hydrogen system can liquefy hydrogen gas to liquid, store and transfer to a dedicated storage tank.

In this study, KIST has built a cryogenic insulation material testing apparatus according to the ASTM C1774, and conducted insulation performance tests for selected materials at liquid hydrogen environment. A series of experiments were carried out under various cold vacuum pressures ranging from high vacuum to ambient pressure, and the results are compared for several cryogenic insulation materials such as aerogel and perlite powders under liquid hydrogen environment.

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