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C4Or1D-02: Improvement of the two-stage Stirling cooler below 20K

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Sumitomo Heavy Industries, Ltd. (SHI) supplies 4K-class and 1K-class cooler for space use. The 4K-class and 1K-class cooler consists of Joule-Thomson(JT)cooler and two-stage Stirling cooler as a pre-cooler . To improve cooling capacity of 4K-class and 1K-class cooler, we are developing the cooling capacity of two-stage Stirling cooler below 20K. The performance of the two-stage Stirling cooler essentially depends on the volumetric heat capacity of its regenerator. We investigated new materials which has higher volumetric heat capacity than stainless steel used in current model , and succeeded improve the cooling capacity of the two-stage Stirling cooler. This paper describes the numerical estimation and the results of cooling tests of the two-stage Stirling cooler using new materials.

Author: YASUDA, Aogu (Sumitomo Heavy Industries, Ltd.)

Co-authors: Mr OTSUKA, Kiyomi (Sumitomo Heavy Industries, Ltd.); Mr SHOJI, Tsunematsu (Sumitomo Heavy Industries, Ltd.); Dr HIRATSUKA, Yoshikatsu (Sumitomo Heavy Industries, Ltd.); Mr KANAOKEN, Ken'ichi (Sumitomo Heavy Industries, Ltd.)

Presenter: YASUDA, Aogu (Sumitomo Heavy Industries, Ltd.)

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