**Aerospace, Paper No. 1.5**

# *Lifetime Verification and Applications of the 1K-Class Joule Thomson Cooler for Space Science Missions*

***K. Shinozaki, JAXA/ISAS; Y. Sato, K.Tanaka and H. Sugita, JAXA/R&D; N.Y. Yamasaki and T. Nakagawa, JAXA/ISAS; K. Mitsuda, NAOJ; S. Tsunematsu, K.Ootsuka, K. Kanao and K.Narasaki, SHI, Japan***

Space-qualified Joule Thomson coolers with significant cooling below 2K enable a variety of missions ranging from large infrared space telescopes, superconducting detectors for astrophysics and quantum applications. In JAXA, a 1K-class Joule-Thomson cryocooler (1K-JT) has been developed with the specified cooling power of 10mW at 1.7K for application to upcoming next-generation astronomy missions. The lifetime test is one of the most critical items to be verified, while the mechanical tests, the thermal vacuum environmental tests, the electromagnetic noise and mechanical disturbance measurements were completed with the engineering models prior to the lifetime test. This paper provides current status of the lifetime verification result with the engineering model. The lifetime test was started on May 2015, and recently achieved 4 years continuous operation without any critical degradations. The recent research, 1K-JT applications including the cooler system demonstration for the ESA X-ray mission Athena, and the cooling performance test with straight heat exchanger for the space infrared telescope mission SPICA are also presented.