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THE FABRICATION AND APPLICATION OF WATER SUBLIMATOR HEAT DISSIPATION
SYSTEM IN CHANG'E 5 LUNAR PROBE

Abstract

To solve the heat dissipation challenges for the lunar lander and ascender combination in Chang'e-5 unmanned automated lunar sampling mission, waster sublimator is selected to cool the system by evaporating/sublimating water to the vacuum lunar environment. A water sublimation heat dissipation system (WSHDS) is proposed and fabricated as a supplementary heat sink of the radiator, theory researches and experiments were conducted in the past decade to verify the phase change and heat mass transfer process in transient start-up, steady-state work performances, performances in microgravity and 1/6g lunar gravity environment. The WSHDS cooled the lunar lander and ascender combination with a 5-10 K temperature decrease in the 383 K-413 K lunar environment, and successfully supported the Chang'e 5 lunar exploration in December 2020. This context summarizes the fabrication and application of WSHDS for the first Chinese Chang'e 5 lunar sampling and return mission, and will propose valuable experiences for the future applications in manned space exploration and lunar exploration.