**Development of High Heat Flux Titanium-Water CCHPs**

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CCHPs are the current method used for cooling almost all spacecraft, including NASA, DoD, and commercial satellites. The maximum heat flux for current aluminum-ammonia CCHPs is roughly 10-15 W/cm2. This limit will affect more and more spacecraft electronics systems as electronics continue to increase in power and decrease in size. Traditionally, CCHPs have achieved limited heat flux due to dry-out at the critical heat flux in the evaporator. During previous development, Advanced Cooling Technologies, Inc. (ACT) identified a hybrid wick configuration that allows an increased critical heat flux, and therefore increased maximum heat flux of the aluminum-ammonia CCHP. Under a NASA Phase IIX SBIR program, ACT demonstrated a hybrid wick (with grooves), high heat flux, titanium-water heat pipe capable of maintaining less than 10 K temperature difference from condenser to evaporator at heat flux values up to 90 W/cm2. Aluminum and ammonia were replaced by titanium and water because of a potential testing opportunity inside the ISS. The experiment was performed with the heat pipe operating against gravity to simulate a zero-gravity environment. The experimental performance of the hybrid wick heat pipe was compared to the performance of an otherwise identical baseline titanium-water heat pipe without the hybrid wick to enable high heat flux. The baseline heat pipe exceeded 10 K temperature difference at a heat flux less than 40 W/cm2.

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