MUREP Small Business Technology Transfer (M-STTR) Planning Grants

Title: Improving Design of Hybrid Two-Phase Capillary Cold Plates through Additive Manufacturing
Institution: University of District of Columbia
City/State: Washington, DC
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SUMMARY: Our proposed research in this NASA M-STTR program is categorized in Thermal Management Systems, which is the NASA Technology Taxonomy 14 and the Focus Area 17 of NASA SBIR/STTR. Rapid miniaturization of electronic components has made extreme challenges for the thermal management of these ever-increasing heat flux devices in spacecrafts. To ensure the reliable operation of future high-power density components, it is necessary to develop effective Thermal Control Systems (TCSs) to overcome the limitations of currently used cooling systems. A TCS is a key technology to maintain the temperature of all spacecraft components within allowable limits during all mission phases. In this M-STTR program, the University of the District of Columbia (UDC), a Historically Black College and University (HBCU), in collaboration with a Small Business, will demonstrate the thermal capability of additively manufactured cold plates of an innovative Two-Phase TCS that has been recently developed by the Small Business. This cooling technology has been demonstrated to achieve low thermal resistances and operate with low pumping power for removing large amounts of heat from multiple high heat flux devices. During this M-STTR program, UDC will improve the design of cold plates and fabricate them. The thermal performance testing will be performed in collaboration between UDC and the Small Business. UDC's proposed research will reduce the current multiple labor-intensive steps for fabrication of cold plates into one additive manufacturing process, which is an important step for commercialization of this novel TCS.