



Licensing Opportunity

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Pulsed Thermal Management for Multi-level Rapid Heat Flux

Advantages

- Ideal for multi-level rapid heat flux
- Has low duty thermal cycles
- Design is easily customizable for various applications large and small
- Non-toxic and passive in its operations

Invention

System and method for thermal management using integrated Vapor Chamber and Thermal Energy Storage (VCTES) system and encapsulated Phase Change Materials (PCMs) to absorb pulsated heated loads.

Background

Researchers at UCF have developed a highly effective thermal management system using a vapor chamber and thermal energy storage (VCTES) system. The design encapsulates the Phase Change Materials (PCM) multiple times, increasing the temporary heat storage capability of the thermal management system while overcoming the limitations of current PCMs.

Light-weight, small hand-held electronics are very common in modern life. These devices release waste heat in pulses. Thus, small thermal management systems, capable of responding rapidly to pulsed heat, are necessary to prevent over-heating. PCMs are used in conventional thermal management systems to regulate temperature. However, these PCMs tend to have very low thermal conductivity and thus cannot respond rapidly and absorb heat. Consequently, the use of such systems would result in the undesirable overheating of the device. Another technique used in thermal systems, is the heat pipe phenomenon. In technologies that employ this, the focus is on transferring heat from one point to another, through a heat pipe and then using a PCM to temporarily store heat. The downside is that such systems are hindered by the major limitation of most PCM technologies, low conductivity. In addition, these systems are not designed to absorb high heat fluxes, are restricted by the critical heat flux of the fluid used and have the possibility of evaporator dry-out.

Application

This technology is suitable for industrial thermal management applications. It can also be used in cooling systems for a variety of devices and technologies such as machine elements, laser diodes, smart phones and desktop computers.

UCF Lead Inventor

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Selected References

Krishna Kota; Louis Chow; Jianhua Du; Jayanta Kapat; Quinn Leland; Richard Harris. Journal of Thermophysics and Heat Transfer 2008 0887-8722 vol.22 no.4 (572-580) doi: 10.2514/1.34998.

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