New study sheds light on cooling capacity of phase change materials

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The global Phase Change Materials (PCM) market was estimated at $300 million in 2009, and is anticipated to grow to $1.5 billion by 2019. Next generation vehicles and aircrafts will depend on PCMs to absorb heat and regulate the temperature of high-power electronics operating in a discontinuous pulsed fashion.

Dr. Patrick Shamberger, assistant professor in the Department of Materials Science and Engineering at Texas A&M University, has found an analytical solution to heat transfer in PCMs used in thermal energy

storage and has identified the relative role of thermo-physical properties of different materials in his article, "Cooling Capacity of Figure of Merit for Phase Change Materials," which was recently published in the *Journal of Heat Transfer*.

Shamberger is a leading researcher in the area of high-energy storage density PCMS and high thermal conductivity thermal energy storage composites.

"It's challenging to make a direct comparison between the relative cooling power of two different materials," said Shamberger. "It's difficult to isolate the effects of materials properties and the effects of component geometry and boundary conditions. Here we defined a relatively simple problem and used it to investigate the relative role of different material parameters on the rate of heat absorption."

Materials scientists and engineers have been working towards developing different thermal energy storage materials with high-energy storage density. Designing materials for high-power electronics is a challenge, as heat needs to be absorbed quickly.

The results of Shamberger's research will be helpful in designing the next generation of high-cooling power thermal storage materials, especially for electronics thermal management applications.

More information: "Cooling Capacity Figure of Merit for Phase Change Materials." *J. Heat Transfer* 138(2), 024502 (Sep 02, 2015) (8 pages). DOI: 10.1115/1.4031252

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