Thermal Performance of Microencapsulated Phase Change Material Slurry

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Under Project 008BE4, Modeling of Heat-Transfer Fluids Containing Phase Change Materials
**Abstract:** The efficiency of a pumped heat-transfer system can be greatly increased by incorporating a phase-change material (PCM). Because PCMs have greater thermal capacity than the carrier fluid, owing to their latent heat of phase change, they can increase the amount of heat transfer at equivalent volumetric flow in a heat exchanging environment. These materials tend to clog heat-transfer and distribution pipes, but previous research has indicated that the problem may be solved by encapsulating the PCMs. This report documents an investigation of the thermophysical properties of PCMs enclosed in micro-scale capsules. The study also addressed microcapsule durability against abrasion and chemicals, and the relation of fluid temperature and particle volume fraction on viscosity.

The results of this research show that the total heat capacity of microencapsulated PCM (MPCM) slurries is enhanced significantly, even when using low volume fractions. MPCM slurries have potential to decrease costs and improve energy efficiency for all pumped cooling applications.