Nanoparticles Dramatically Improve Chiller Efficiency

Supporting/Contributing Agencies: NIST

NIST's Nanofluids Heat Transfer Measurements Project has demonstrated that nanolubricants and their properties can be used to reduce the Nation's demand for energy via improved heat transfer. One nanolubricant — a lubricant for chillers that incorporates a dispersion of nanometer-sized particles — has already been shown to improve the boiling heat flux by nearly 300% compared to the original nanoparticle-free refrigerant. This accomplishment is important because buildings consume 72% of the nation's electricity, 13% of which is consumed for air conditioning alone. NIST's nanotechnology-based enhancement has great promise for practical applications because the nanolubricant cost is expected to be comparable to that of the traditional chiller lubricant, providing a nearly cost-neutral improvement in efficiency. Based on the prospect of an economical yet dramatic improvement in chiller efficiency, key refrigeration industry companies have partnered with NIST to evaluate this technology for rapid commercialization. This new application of nanotechnology promises to enhance both new and existing chillers with the potential to substantially reduce electricity consumption in buildings in a very cost-effective way.

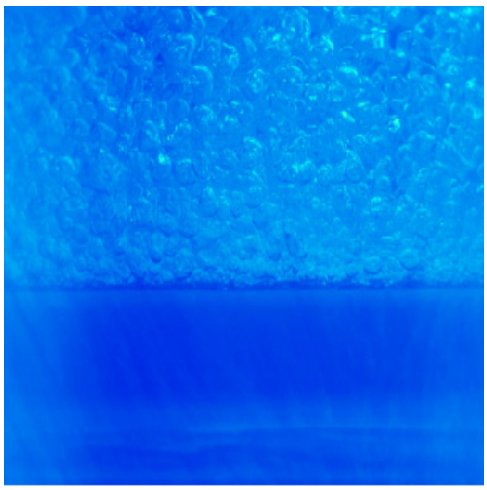

Figure 1. Optical microscopy image of a boiling refrigerant/nanolubricant mixture (10 mm field of view).

References/Publications/Patents

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