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Thermal transport in colloidal silica system: effect of particle size and aggregation GANG CHEN, FAN JIANG, Department of Physics and Astronomy, Ohio University, WENHUA YU, JULES ROUTBORT, Energy Systems Division, Argonne National Laboratory, DEPARTMENT OF PHYSICS AND ASTRONOMY, OHIO UNIVERSITY TEAM, ENERGY SYSTEMS DIVISION, ARGONNE NATIONAL LABORATORY COLLABORATION — Knowledge of the size and distribution of nanoparticles in solution is critical to understanding the observed enhancements of thermal conductivity in colloidal systems. We have applied small-angle x-ray scattering (SAXS) to study particle size and distribution of monodispersed and aggregated silica colloids. A hot-wire method has been used to measure thermal conductivity of the colloidal system. The results indicate that the thermal conductivity depends not only on the particle concentration, but also on the particle size and distribution. The experimental data contradict thermal transport models based on fluid interfacial layers or Brownian motion but shed light on the detrimental role of liquid-particle interface on the thermal transport properties.

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