

The Thermal Conductivity of AlN Nanofluid

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Nanofluids are fluid suspensions of nanometer-sized solid particles and fibers. Results of nanofluids with particles of different sizes and different volume percentages, including Cu, CuO, Al₂O₃, carbon nanotube, etc., are exciting and generally much larger than the results predicted by the theories of Maxwell, Hamilton, and Crosser, etc.

AlN has an unusually high thermal conductivity up to 320 W/m·K. In this work, AlN particles with 20 nm size are dispersed into ethanol by a two-step process, first by magnetic striation and then by ultrasonic agitation. Castor oil is added as a dispersant to improve the stability of the AlN suspension. The thermal conductivity of AlN Nanofluid is measured by the Hot Disk method from 0.5 vol % to 4.0 vol % at temperatures 273.15 K and 297.15 K. Results show a 20 % increase in the thermal conductivity of ethanol with the addition of 4.0 vol. % at 273.15 K, and strong temperature dependence of thermal conductivity.