

Relation between the thermal conductivity and aggregate size of titania nanofluids

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In this research, we have investigated the effect of the aggregated structure of spherical nanoparticles on thermal conductivity of nanofluids. Titania nanofluids were prepared by dispersing 0.5 - 6.0 wt% of nanoparticles of spherical shape in water or ethylene glycol. pH was adjusted by adding NaOH. The size of aggregate of nanoparticles was also measured by using DLS while changing temperature from 15°C to 55°C. The thermal conductivity of nanofluid was also measured at the same temperature range. Experimental results show that the size of particle aggregate increases with temperature upto 10% for water-based titania nanofluids. Thermal conductivity ratios with temperature show similar behavior for the concentration range. In the case of the ethylene glycol based titania nanofluids, the thermal conductivity ratio increases with concentration of particles at the temperature range. And the size of particle aggregates does not change with temperature for ethylene glycol based titania nanofluids. We observed a strong correlation between thermal conductivity and size of aggregated structures in nanofluids.