

Thermal Conductivity of Al₂O₃/Water-Based Nanofluids: Revisiting the Influences of pH and Surfactant

Authors : Nizar Bouguerra, Ahmed Khabou, Sébastien Poncet, Saïd Elkoun

Abstract : The present work focuses on the preparation and the stabilization of Al₂O₃-water based nanofluids. Though they have been widely considered in the past, to the best of our knowledge, there is no clear consensus about a proper way to prepare and stabilize them by the appropriate surfactant. In this paper, a careful experimental investigation is performed to quantify the combined influence of pH and the surfactant on the stability of Al₂O₃-water based nanofluids. Two volume concentrations of nanoparticles and three nanoparticle sizes have been considered. The good preparation and stability of these nanofluids are evaluated through thermal conductivity measurements. The results show that the optimum value for the thermal conductivity is obtained mainly by controlling the pH of the mixture and surfactants are not necessary to stabilize the solution.

Keywords : nanofluid, thermal conductivity, pH, transient hot wire, surfactant, Al₂O₃, stability, dispersion, preparation

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