World Academy of Science, Engineering and Technology
International Journal of Mechanical and Mechatronics Engineering
Vol:8, No:05, 2014

Effect of Surfactant on Thermal Conductivity of Ethylene Glycol/Silver Nanofluid

Authors : E. C. Muhammed Irshad

Abstract : Nanofluids are a new class of solid-liquid colloidal mixture consisting of nanometer sized (< 100nm) solid particles suspended in heat transfer fluids such as water, ethylene/propylene glycol etc. Nanofluids offer excellent scope of enhancing thermal conductivity of common heat transfer fluids and it leads to enhancement of the heat transfer coefficient. In the present study, silver nanoparticles are dispersed in ethylene glycol water mixture. Low volume concentrations (0.05%, 0.1% and 0.15%) of silver nanofluids were synthesized. The thermal conductivity of these nanofluids was determined with thermal property analyzer (KD2 pro apparatus) and heat transfer coefficient was found experimentally. Initially, the thermal conductivity and viscosity of nanofluids were calculated with various correlations at different concentrations and were compared. Thermal conductivity of silver nanofluid at 0.02% and 0.1% concentration of silver nanoparticle increased to 23.3% and 27.7% for Sodium Dodecyl Sulfate (SDS) and to 33.6% and 36.7% for Poly Vinyl Pyrrolidone (PVP), respectively. The nanofluid maintains the stability for two days and it starts to settle down due to high density of silver. But it shows good improvement in the thermal conductivity for low volume concentration and it also shows better improvement with Poly Vinyl Pyrrolidone (PVP) surfactant than Sodium Dodecyl Sulfate (SDS).

Keywords : k-thermal conductivity, sodium dodecyl sulfate, vinyl pyrrolidone, mechatronics engineering
Conference Title : ICMMME 2014 : International Conference on Mechanical, Materials and Mechatronics Engineering
Conference Location : Paris, France
Conference Dates : May 19-20, 2014