

Improved thermal conductivity of TiO₂-SiO₂ hybrid nanofluid in ethylene glycol and water mixture

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Abstract. The need to study hybrid nanofluid properties such as thermal conductivity has increased recently in order to provide better understanding on nanofluid thermal properties and behaviour. Due to its ability to improve heat transfer compared to conventional heat transfer fluids, nanofluids as a new coolant fluid are widely investigated. This paper presents the thermal conductivity of TiO₂-SiO₂ nanoparticles dispersed in ethylene glycol (EG)-water. The TiO₂-SiO₂ hybrid nanofluids is measured for its thermal conductivity using KD2 Pro Thermal Properties Analyzer for concentration ranging from 0.5% to 3.0% and temperature of 30, 50 and 70°C. The results show that the increasing in concentration and temperature lead to enhancement in thermal conductivity at range of concentration studied. The maximum enhancement is found to be 22.1% at concentration 3.0% and temperature 70°C. A new equation is proposed based on the experiment data and found to be in good agreement where the average deviation (AD), standard deviation (SD) and maximum deviation (MD) are 1.67%, 1.66% and 5.13%, respectively.

1. Introduction

The nanofluids are proven to be one of the suitable heat transfer fluid as its thermal properties are improved compared to conventional fluid such as water, ethylene glycol (EG) and oil based fluid [1, 2]. Recently, hybrid nanofluid gain attention among researcher due to its augmentation in thermal properties compared to single nanofluid. Hybrid nanofluid can be defined as combination of two or more different types of nanoparticles dispersed in a base fluid [3, 4].

