

An experimental study to measure the concentration of nanofluid by using refractive index

NG Kwan

RMIT University, Australia

The concentration plays a decisive role in nanofluids. Most thermo-physical properties changes of nanofluids, such as thermal conductivity, thermal diffusivity, viscosity and convective heat transfer coefficient, all depend on the concentration of nanofluids. However, there are no recognized effective methods for measuring the concentration of nanofluids after the preparation until present. This matter will hinder nanofluid quality assurance and the real time monitoring on the performance of nanofluids during the operation. Thus, the purpose of this research is to experimentally measure the concentration of Titanium Oxide (TiO₂) nanofluids by refractive index minimum deviation method. TiO₂ nanopowder of 21nm and with selected distilled water to the experiment. The two-step method was adopted to prepare nanofluids. The experiments were conducted by measuring the laser beam displacement in room temperature 22°C and concentration of 10 TiO₂ nanofluids samples with practical mass fraction of nanopowder ranging from 0.001% to 0.04%. The refractive index of the samples were then calculated based on Snell's law. According to the calculation, the correlation between refractive index and concentration of nanofluids will be interpreted. Results of the experiment show that the refractive index value roughly linearly increased from 1.341 to 1.395 by increase in the mass fraction concentration. Results of this works will be very helpful for further development of the precise methods for measurement of nanofluids concentration.

Biography

NG Kwan presently attending a Bachelor of Engineering Degree in Mechanical Engineering (Honours) in RMIT University. He obtained the RMIT School of Engineering Award in 2018. He received a Higher Diploma in Mechanical Engineering (Distinction) in Hong Kong Institute of Vocational Education in 2017. He have more than 16 years experience in inspection, test and examination of structure, motor, plant and machinery accordance with the currently statutory requirements. He also has more than 10-year experience in project management. After completing the Bachelor Degree program, he is interested in continuing his study on the technology and application of nanofluids.