

Study of the Thermal Properties Solution-Dissolved TiO₂ Nanoparticles

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Abstract

Nanofluids, prepared by dispersing TiO₂ nanoparticles in water, were studied by two photothermal techniques: Thermal lens spectrometry (TLS) and photopyroelectric (PPE). TLS and PPE were used to measure respectively the thermal diffusivity and thermal effusivity of these nanofluids. Scanning electron microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) techniques were used to characterize the TiO₂ nanoparticles which have spherical shape with about 80 nm average size of diameter. The experimental results show that the thermal diffusivity (D) increased when the particle volume fraction increases. Also it is possible to see that thermal effusivity (e) had a similar behavior to the results of thermal diffusivity. From thermal diffusivity and effusivity results it was calculated the sample thermal conductivities k ($k = \sqrt{D e}$). It was found an increment of the thermal conductivity of solutions containing TiO₂ nanoparticles, with 1 % of volume fraction.