

# Ultrasonic and Thermophysical Studies of Ethylene Glycol Nanofluids Containing Titania Nanoparticles and Their Heat Transfer Enhancements

## Next-generation heat transfer nanofluids for industrial applications

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In the present investigation, TiO<sub>2</sub> nanostructures were synthesised *via* a simple sol-gel technique and characterised with X-ray diffraction (XRD), scanning electron microscopy with energy-dispersive X-ray analysis (SEM-EDX), high-resolution transmission electron microscopy (HR-TEM) and ultraviolet-visible (UV-vis) spectroscopy. The temperature and concentration dependence of thermal conductivity enhancement (TCE) and ultrasonic velocity have been explored in ethylene glycol-based TiO<sub>2</sub> nanofluids. The obtained results showed 24% enhancement in thermal conductivity at higher temperature (80°C) of the base fluid ethylene glycol by adding 1.0 wt% of TiO<sub>2</sub> nanoparticles. The behaviour of TCE and ultrasonic velocity with temperature in prepared nanofluids has been explained with the help of existing phenomena. The increase in ultrasonic velocity in ethylene glycol with TiO<sub>2</sub> nanoparticles shows that a strong cohesive interaction force arises among the nanoparticles and base fluid. These results