

Study of Ultrasonic Attenuation and Thermal Conduction in Bimetallic Gold/Platinum Nanofluids

Effect of thermal conductivity on ultrasonic attenuation of gold and gold/platinum nanofluids

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Here, we report the frequency dependent ultrasonic attenuation of monometallic gold and bimetallic gold/platinum based aqueous nanofluids (NFs). The as-synthesised bimetallic NFs (BMNFs) revealed less resistance to ultrasonic waves compared to the monometallic NFs. Thermal conductivity of both NFs taken at different concentrations revealed substantial conductivity improvement when compared to the base fluid, although gold/platinum showed lesser improvement compared to gold. Characterisation of the as-synthesised nanoparticles (NPs) and fluids was carried out with X-ray diffraction (XRD), ultraviolet-visible (UV-vis) spectroscopy, transmission electron microscopy (TEM) and energy-dispersive X-ray spectroscopy (EDS). The distinct two-phase bimetallic nature of gold/platinum, its two plasmonic band optical absorption features and the spherical morphology of the particles were shown. The findings were correlated with the observed thermal and ultrasonic behaviour and proper rationalisation is provided. It