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# Effect of Carbon Nanotubes on Thermophysical Properties of Photothermal Fluid and Enhancement of Photothermal Deflection Signal

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**Abstract :** Thermophysical properties of Carbon Tetrachloride ($CCl_4$), a photothermal fluid used frequently in Photothermal Deflection Spectroscopy (PDS), containing different volume fractions of single walled carbon nanotube (SWCNTs) and their effect on the amplitude of PDS signal are investigated. It is found that the presence of highly thermally conducting SWCNTs in $CCl_4$ enhances the heat transfer from heated sample to the adjoining photothermal fluid, resulting in an increase in the intensity of amplitude of PDS signal. With the increasing volume fraction of SWCNTs in $CCl_4$, the amplitude of PDS signal is nearly doubled for volume fraction fopt $=3.7X10^{-3}$ %., after that the signal drops with a further increase in the fraction of SWCNTs. It is shown that the use of highly thermally conducting carbon nanotubes enhances the heat exchange coefficient between the heated sample surface and adjoining fluid, resulting to an enhancement of PDS signal and consequently the improvement in the sensitivity of PDS technique.

**Keywords :** carbon nanotubes, heat transfer, nanofluid, photothermal deflection spectroscopy, thermophysical properties
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