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Statistical analysis of thermal conductivtiy experimentally measured in water-based nanofluids

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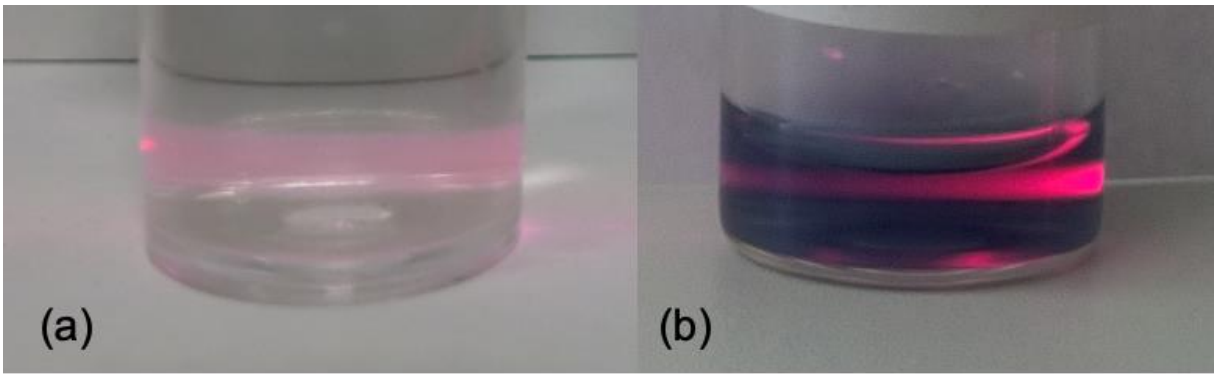

Fig.1: Light scattering of colloidal nanoparticles (Tyndall-Effect) on water-based nanofluids with (a) low concentration and (b) high concentration of tungsten nanoparticles

Nanofluids are suspensions of nanoparticles in a base heat-transfer liquid. They have been widely investigated to boost heat transfer since they were proposed in the 1990's. Despite the consensus that the improved heat transfer is due to increased thermal conductivity, there is a lack of agreement regarding the underlying physical mechanisms and the degree of enhancement.

This talks aims to give an overview on the fundamentals of nanofluids and presents a statistical analysis of experimentally measured thermal conductivity of water-based nanofluids available in the literature. The nanofluids we have chosen for this analysis include alumina, titania, copper oxide, silica, copper and silicon carbide particles suspended in water. The statistical analysis shows the dependence of thermal conductivity on concentration, temperature and particle size, despite the large scatter in the data prevent a quantification of these effects. However, the analysis herein conclusively shows that the practical potential of nanofluids is extremely limited.