

Two Metrological Aspects of Auto-Normalized Front Photopyroelectric Method to Measure Thermal Effusivity in Liquids

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The combination of two metrological aspects of auto-normalized front photopyroelectric technique for thermal effusivity measurements in liquids is used to show the limits of this technique. The first one is the sensitivity of the signal, and the other one is the signal to noise ratio. For the case of thermally thick samples, the sensitivity is a function only of the thermal effusivity of the sample. In this photothermal situation, when the sample is water, the change of sensitivity is equal to the changes of the thermal effusivity in the frequency range from 0.01 to 0.05 Hz, and decrease up to 70 % if the frequency is increased up to 10 Hz. These results are discussed with the experimental measurements of the signal to noise ratio. We show that the front photopyroelectric technique is a very good tool to measure changes in thermal effusivity above 5%.