

Self-Normalized and Self-Consistent Photoacoustic Methodologies for Thermal Effusivity Measurements of Liquids

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Self-normalized and self-consistent photoacoustic methodologies for thermal effusivity measurements of liquids, in the modulation frequency domain, are described. Both photoacoustic (PA) configurations are involved, the front PA configuration, which is used for thermal effusivity measurements of general liquids and the transmission PA configuration, which is used for thermal effusivity measurements of transparent liquids. Criteria as to verify the validity of the theoretical assumptions (the thermally thin regime) are also provided. Two thermal effusivity values are obtained for each configuration, one from the self-normalized PA amplitude and the other one from the self-normalized phase. Several homogeneous liquid samples were used for this work: distilled water, ethanol and some vegetable oils. Excellent agreement between the thermal effusivity values measured for each substance by means of each PA methodology was obtained.

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