

Study of the Thermal Diffusivity of Degraded Grape Oils Using a Thermal Wave Interferometer

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Photothermal methods, in particular the photopyroelectric technique in its several experimental variants, have been extensively used for measurement of thermal properties of liquids, mostly the thermal effusivity and the diffusivity. The potential applications in this field of the so-called thermal wave interferometric (TWI) approach have been demonstrated elsewhere [1]. In this paper, we report on the use of the TWI in the cavity-length-scan mode to measure the thermal diffusivity of commercial grape oil samples with different degrees of degradation induced by heating cycles. A linear relationship between the logarithm of the pyroelectric signal amplitude and the sample length was observed, in agreement with the basic theory for the experimental configuration that was used, from which thermal diffusivity values of the samples were obtained. The experimental results show that, as in other food materials, thermal diffusivity of grape oils is strongly affected by degradation processes, as observed by other authors using a thermal lens technique [2]. This work represents a new step in order to demonstrate the capability of TWI for characterization of the thermal properties of liquids.

[1] H. Coufal, "Photoacoustic procedure for measuring thermal parameters of transparent solids," *Appl. Phys. Lett.* **45**, 516 (1984).

[2] J. Bernal-Alvarado, A.M. Mansanares, E.C. da Silva, S.G.C. Moreira, "Thermal diffusivity measurements in vegetable oils with thermal lens technique," *Rev. Sci. Instrum.* **74**, 697-699 (2003).