

Thermal Wave Resonator Cavity Applied to the Study of the Thermal Diffusivity of Coffee Infusions

B. Briseño Tepepa · E. Marín ·
E. San Martín-Martínez · A. Cruz Orea

Received: 14 October 2008 / Accepted: 14 July 2009 / Published online: 31 July 2009
© Springer Science+Business Media, LLC 2009

Abstract Among the photothermal methods, the photopyroelectric technique, in its several experimental configurations, has been extensively used to measure the thermal properties of liquids, mainly the thermal effusivity and diffusivity. In this paper, the use of the so-called thermal wave resonator cavity method, in the cavity-length-scan mode, to measure the thermal diffusivity of commercial coffee infusions with samples at different concentrations and degrees of degradation induced by heating cycles is reported. A linear relationship between the logarithm of the pyroelectric signal amplitude and the sample thickness was observed, in agreement with the basic theory for the experimental configuration used here, from which the thermal diffusivity values of the samples were obtained. The thermal diffusivity was found to be almost independent of the coffee concentration in water but that this parameter is sensitive to sample modifications induced by degradation. This work represents another step to demonstrate the capability of the used method for characterization of the thermal properties of liquids.

Keywords Coffee infusions · Photopyroelectric technique · Thermal diffusivity · Thermal wave

1 Introduction

Monitoring the quality of coffee is an important area of research due to the fact that coffee is one of the most popular beverages worldwide. An in-depth search into the

B. B. Tepepa · E. Marín · E. S. Martín-Martínez
CICATA-IPN, Legaría 694, Col. Irrigación, 11500 México, D.F., México

A. C. Orea (✉)
Departamento de Física, CINVESTAV-IPN, A.P. 14-740, 07360 México, D.F., México
e-mail: orea@fis.cinvestav.mx