

Photothermal techniques applied to the study of thermal properties in biodegradable films

E. San Martín-Martínez¹, M.A. Aguilar-Méndez¹, A. Cruz-Orea², and A. García-Quiroz³

¹ Centro de Investigación en Ciencia Aplicada y Tecnología Avanzada-IPN (CICATA-IPN),
11500 México, D.F., Mexico

² Departamento de Física, CINVESTAV-IPN, Apdo. Postal 14-740, 07360 México, D.F., Mexico

³ Universidad Autónoma de la Ciudad de México, D.F., Mexico

Abstract. The objective of the present work was to determine the thermal diffusivity and effusivity of biodegradable films by using photothermal techniques. The thermal diffusivity was studied by using the open photoacoustic cell technique. On the other hand the thermal effusivity was obtained by the photopyroelectric technique in a front detection configuration. The films were elaborated from mixtures of low density polyethylene (LDPE) and corn starch. The results showed that at high moisture values, the thermal diffusivity increased as the starch concentration was higher in the film. However at low moisture conditions (<9%) the thermal diffusivity diminished when the starch content in the sample was increased. On the other hand the thermal effusivity has a behavior in opposition to the thermal diffusivity. The thermal effusivity increased with the increase of the starch content in the film, at low extrusion moisture conditions (6.55%). As the moisture and starch concentration in the films were increased, the thermal effusivity diminished.