# Photothermal Techniques Used to the Thermal Characterization of Resin Applied in Laser Stereolithography

José Luis Jiménez Pérez [C] and Pavel Vieyra Pincel
*Photothermal Characterization Techniques, Unidad Profesional Interdisciplinaria en Ingeniería y Tecnologías Avanzadas, México DF, México*
*jimenezp@fis.cinvestav.mx*

Alfredo Cruz-Orea[S]
*Departamento de Física, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, México DF, México*

Zormy Nacary Correa Pacheco
*Centro de Desarrollo de Productos Bióticos (CEPROBI), Instituto Politécnico Nacional, Yautepec, Morelos, México*

Thermal and optical properties of a liquid resin were studied by thermal lens (TLS), open photoacoustic cell (OPC) and photoacoustic (PA) spectroscopy respectively. In the case of the TLS technique the two mismatched mode experimental configuration was used with a He-Ne laser, as a probe beam and an Ar+ laser the excitation one. The characteristic time constant of the transient thermal lens was obtained by fitting the theoretical expression to the experimental data in order to obtain the thermal diffusivity (D) of the resin. On the other hand, the sample thermal effusivity (e) was obtained by using the OPC technique where the temperature variation of the sample, exposed to modulated radiation, is measured with a photoacoustic sensor. In this technique an Argon laser was used as the excitation source and was operated at 514 nm with an output power of 30 mW. From the obtained thermal-diffusivity (D) and thermal effusivity (e) values, the thermal conductivity (k) and specific heat capacity per unit volume (ρc) of resin were calculated through of the relationships $k = e(D)1/2$ and $\rho c = e/(D)1/2$. The obtained thermal parameters were compared with the thermal parameters of literature. To our knowledge the thermal characterization of resin has not been reported until now. Our work has applications in laser stereolithography to manufacture 3D printing pieces.