

# **Comparison Between Different Photothermal Deflection Methods to Determine Thermal Properties of Bulk Semiconductor Samples**

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In this paper we will describe and compare different easy to develop and inexpensive methods based on the photothermal deflection technique which permits the determination of the thermal diffusivity of bulk semiconductor material. The first method consists of plotting the experimental amplitude and phase variation of the photothermal deflection signal versus modulation frequency. The sample placed in air is heated with a modulated pump uniform beam. The only difference between the first and the second method is that in the second method the sample is covered by a thin graphite layer. We show in this study that the first method is only sensitive to the thermal diffusivity of the sample however the second method is sensitive to both thermal diffusivity and thermal conductivity. Finally the third method, which is a spectroscopic one, consists of plotting the experimental phase and amplitude of the photothermal signal versus wavelength at a fixed modulation frequency. The sample is immersed in a  $\text{CCl}_4$  filled cell. In this study we show that the phase signal saturates for high and low optical absorption coefficient values. The phase difference between the two saturated regions is a function of the thermal diffusivity of the sample.