Thermal Diffusivity of Extremely Thin Polymer Films

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Introduction

Determination of the thermal conductivity of thin polymer films by means of the laser flash method is mainly limited by two factors:

- Sample thickness: Related to this are very short measurement times
- Scattered light of the flash lamp: Due to the small mass, the sample is not ideally located in the sample holder

A solution to this offers the LFA 467 HyperFlash® (see figure 1). Due to its high data acquisition rate of 2 MHz, a short pulse time (up to 20 µs) and a special sample holder for thin samples (see figure 2), measurements on samples with a small thickness can simply and quickly be realized.

Measurement Conditions

An approximately 20 µm-thick polymer film was measured by means of the LFA 467 HyperFlash® between -40°C and 140 °C. In order to obtain an opaque sample, gold was sputtered onto the film prior to the measurement. Using graphite as a coating material is not recommended for such thin samples since it might influence the measurement results. More information on the optimal coating of samples can be found under [1].
For determination of the specific heat capacity of very thin samples, a DSC measurement is recommended. Along with the density data, the thermal conductivity can then also be determined.

**Literature**

[1] Application Note 066: When and How Must Samples Be coated During LFA Measurements?