

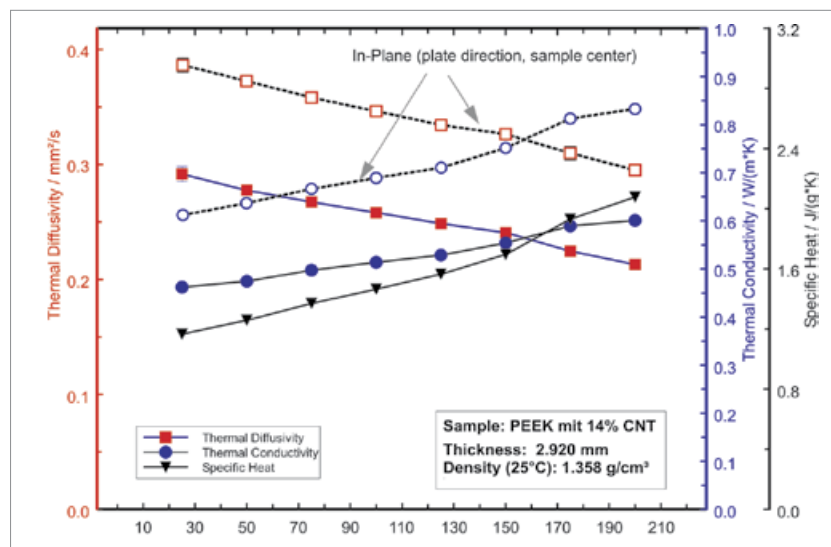
APPLICATION SHEET

POLYMERS – POLYMER MANUFACTURING

POLYETHERETHERKETONE (PEEK) WITH CARBON NANOTUBES (CNT)

The use of nanoparticles in a polymer matrix offers a broad range of possibilities to control the mechanical and thermophysical properties of polymers for later application. The influence of carbon nanotubes (CNT) on the thermal conductivity is investigated by LFA measurements and will be shown in this application sheet. A PEEK sample with

14% CNT was tested from room temperature up to 200°C in different directions (thru plane, in-plane). A standard sample holder and a special sample holder for laminated samples were used. The thermal conductivity was calculated by multiplying the measured values for the bulk density, specific heat and thermal diffusivity.



Instrument

LFA 447 NanoFlash®

Test Conditions

Temperature range	25 ... 200°C
Sample holder	12.7 mm diameter
Sample thickness	2.9 mm
c_p from LFA, standard	pyroceram

Results

The thermal conductivity increases with temperature as expected for samples with amorphous structures (amorphous and semicrystalline). Significant differences were detected in dependence on the measurement direction. The influence of the CNT orientation within the polymer matrix leads to differences in the thermal conductivity of more than 40%. The example clearly demonstrates that the LFA method yields reliable values to investigate the influence of nanotubes within a polymer matrix. In addition, it was shown that the LFA 447 allows direction-dependent measurements.