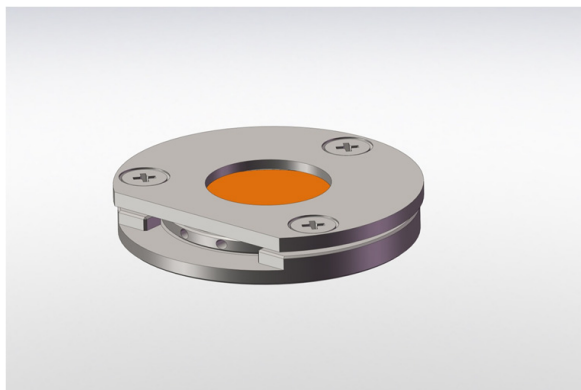


New Sample Holder for Low-Viscosity Liquids Part 1 – Principle and Test Results of Water

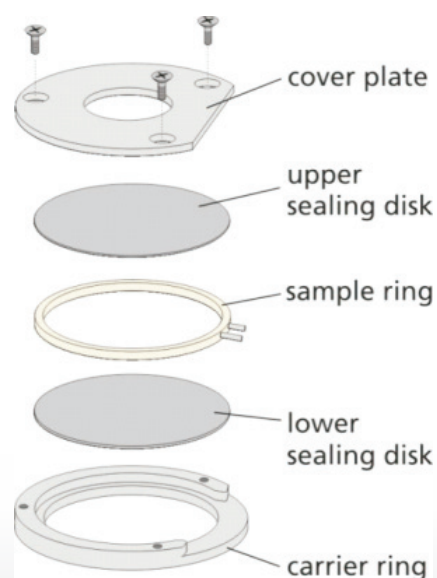
Dr. André Lindemann

For LFA measurements, a defined sample thickness is required. The thermal diffusivity (a) is proportional to the square of the sample thickness (d): $a \sim d^2$. This demands high precision to get the exact thickness value, especially for thin samples or films with less than 600 μm in thickness. In addition, the heat flow through the outer container walls in axial direction can be critical for sample holders for liquids, pastes and powders. Furthermore, measurements on polymer melts and resins during curing can destroy the complete sample holder due to the small wall thicknesses of the crucible and aluminum lid. In order to overcome the mentioned

critical points, a new sample holder for low-viscosity liquids such as water, oils and resins (e.g. during curing) was developed. The special design with parts from stainless steel and a PEEK ring allows time- and cost-reduced measurements with high precision. The liquid sample is measured between two stainless steel plates and a polymer ring (PEEK). The parts are fixed between a carrier ring and a cover plate from stainless steel. The filling ports in the PEEK ring allow injection of the liquid after assembly of the parts. The stainless steel plates and the PEEK ring can be easily exchanged after measurements on melts or resins.



1 Sample holder for low-viscosity liquids



2 Setup of the sample holder

APPLICATION NOTE New Sample Holder for Low-Viscosity Liquids

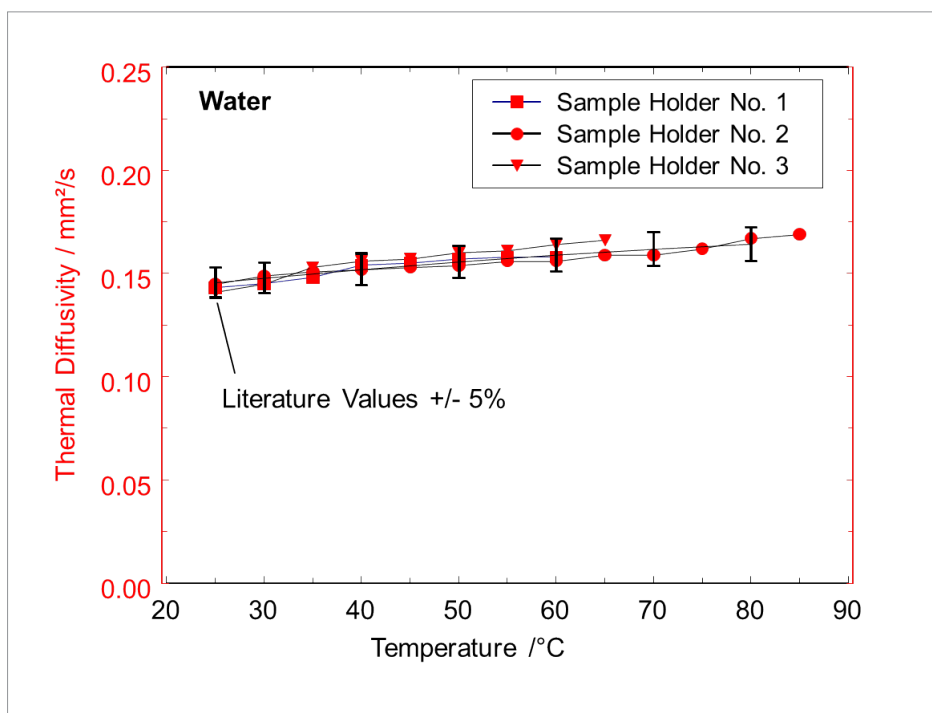
Test Conditions

Temperature range:
25°C to 85°C

Sample thickness:
1.5 mm

Sample holder:
Stainless steel / PEEK for liquids

Sample surface preparation:
-



3 LFA measurements on water

Measurement Results

Water was measured several times with the new sample holder. The measurement results are in perfect agreement with the values typically found in literature for this liquid. The differences between the individual results and the difference compared to literature (average value) are less than 2.5% over the

entire temperature range. Similar measurements were also already carried out in the container on engine oils and epoxy resin during curing (see application note, parts 2 and 3). The sample holder is available for all LFA devices.