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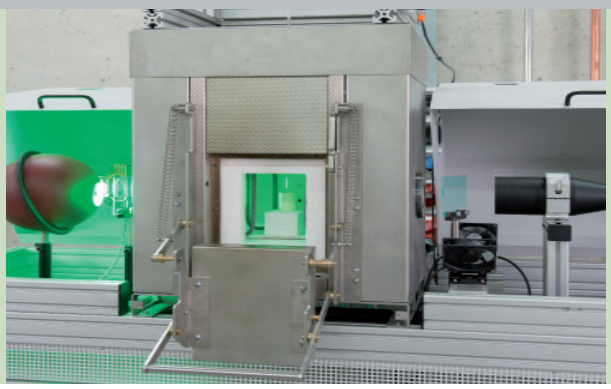

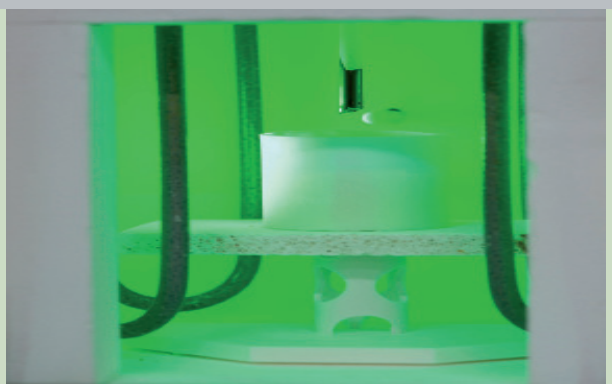

TOMMI*PLUS*

A THERMOOPTICAL MEASURING DEVICE FOR THE CONTROL OF THERMAL PROCESSES

TOMMI*plus* is a follow-up model of TOMMI with improved performance and more flexibility. It combines a high temperature furnace with an optical dilatometer. The cross-light silhouette of the sample is recorded by a CMOS camera. A special optical system provides an imaging without distortion – even if the sample slightly shifts during the heat treatment, e. g. due to thermal expansion.

Dimensional changes of the sample are registered by a purpose-made image analysis software; the sample may be of any shape as long as its complete silhouette remains within the dilatometer window. Measurements are taken once every second so that rapid changes can be registered. Furthermore, melting and wetting phenomena can be investigated by examining the

TOMMI*plus* is controlled by a standard PC and operated via a comfortable graphical user interface. Besides the data on dimensional changes, single images as well as time-lapsed videos of the thermal treatment can be obtained. The resolution of TOMMI*plus* is about 0.5 µm with very high reproducibility.

TOMMI*plus* is optionally available with:

- several loading stages
- a module to measure the surface tension and the melting viscosity during heating
- a balance for the simultaneous gravimetric investigation of the sample

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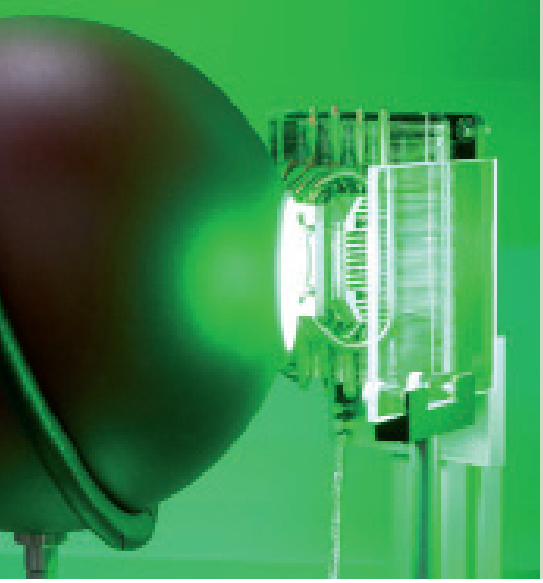

Ceramics…

are densified and strengthened by sintering. This process controls the quality of the final product – and considerably contributes to production costs. The sintering shrinkage is the most important property which gives information about the sintering state. Close monitoring of shrinkage and warping during firing can be used to optimize firing conditions.

The tasks

- Monitoring of the sintering shrinkage without mechanical impact
- Recording of any warping or adherence of the sample during sintering even if the sample shape is quite irregular
- Measuring creep properties under well defined constant or cyclic loads

Glasses…

are molten and shaped at low viscosities. Numerous thermophysical data are required on the way from the raw material to the melt to ensure the precise design of the thermal processes. The measuring of thermophysical properties of glasses around the softening temperature is particularly difficult.

The tasks

- Determination of the expansion coefficient in the range from low temperatures up to those of melt, i. e. also around the softening temperature
- Monitoring of the melting behavior as well as the wetting of refractories and metallic molds by the glass melt at high temperatures
- Measuring the surface tension and the viscosity of melting during the heating process via the maximum bubble pressure method and frequency analysis of gas bubbles

Your Benefit…

- Non-contact optical measuring mode
- No mechanical impact on the sample
- No chemical reactions and no caking
- No movable mechanical parts
- Two-dimensional silhouette recording
- Simultaneous recording of up to 20 parameters by special image processing software
- Simultaneous recording of tempera ture distribution at sample surface
- Compensation of shifts within the measuring window
- Automatic adaption of illumination to brightness and contrast of images
- High reproducibility
- High temperature in situ measuring

Technical Data

° Height x width x length:	700 x 700 x 1600 mm
° Max. temperature:	1750 °C or 1200 °C
° Diameter measuring window:	adaptable from minimum 3 mm to maximum 0 mm
° Resolution:	0.4 µm

Optional features

- Computer controlled loading stage with range of 0-20 N or 0-200N
- Special loading stages for testing tensile stress or beam bending
- Rotating sample support for 3D measurement
- Thermobalance with measuring tolerance of 0.1 g
- Maximum bubble pressure sensor range of 0-2000 Pa