Your advantages

Non-contact optical measuring mode
- No mechanical impact on the sample.
- No movable mechanical parts.

Two-dimensional silhouette recording
- Measuring of anisotropic sintering processes and warpage.
- Monitoring of wetting, melting and infiltration phenomena.
- Simultaneous recording of up to 20 parameters.

Image processing software
- Automatic compensation of shifts within the measuring window.
- Optimization of the image contrast by illumination control.
- Measurements every second in order to record rapid dimension changes.
- High reproducibility.

Atmosphere control
- Automatic switching between pumping and gas flow.
- Computer control of gas mixtures.
- High vacuum conditions.

TOM-AC is optionally available with a weight sensor for simultaneous gravimetric investigation of the sample. A further option is the equipment for measuring samples loaded with uni-axial force.

Technical data

TOM-AC – optical dilatometer for the control of thermal processes with controlled atmosphere

height x width x length	2500 x 1000 x 2600 mm
max. temperature:	2000 °C
measuring window diameter:	50 mm
resolution:	2 µm

Contact

Dr. Andreas Diegeler
Phone +49 9342 9221-702
andreas.diegeler@isc.fraunhofer.de

Pay Schulze Horn
Phone +49 9342 9221-726
pay.schulze_horn@isc.fraunhofer.de

Further information

F. Raether, J. Meinhardt, P. Schulze Horn, TOM – a versatile thermooptical measuring system for the optimization of heat treatments, CFI/Ber. DKG 84 (2007) E18- 21

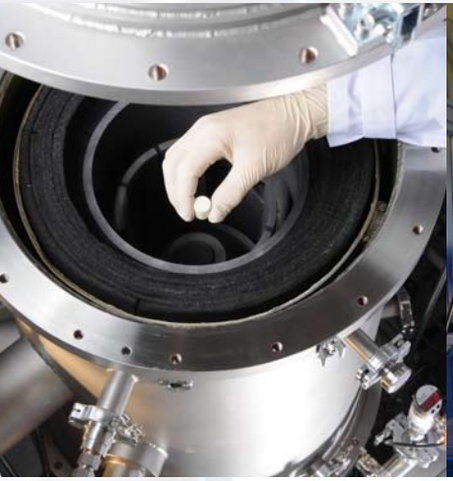
http://www.isc.fraunhofer.de
http://www.sinteropt.de

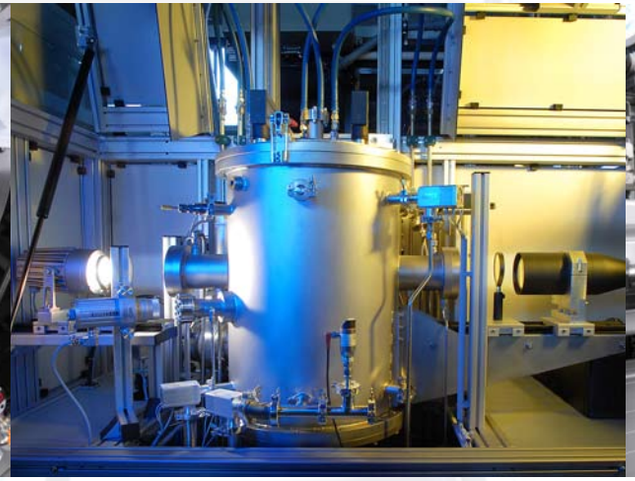
Fraunhofer-Institut für Silicatforschung ISC
Neunerplatz 2
97082 Würzburg, Germany
Phone +49 931 4100-0
info@isc.fraunhofer.de

Bronnbach Branch
Measuring and Process Technology
Bronnbach 28
97877 Wertheim, Germany
Phone +49 9342 4100-701

TOM-AC
- an optical dilatometer for the control of thermal processes in controlled atmosphere

Fraunhofer ISC
Institut Silicatforschung





Precise material data at high temperatures

Sintering

Ceramics and powder metallurgical materials are densified and strengthened by way of sintering. This process determines the quality of the final product – and accounts for a considerable part of the production cost . As sintering shrinkage is the most telling indicator of the sintering state, close monitoring of the shrinkage during the heat treatment can be used to optimize the processing parameters.

The tasks

- Monitoring of the sintering shrinkage without mechanical impact by the measuring device on the samples.
- Recording of any warpage of the sample during sintering even if the sample shape is quite irregular.
- Heat treatment in vacuum, inert or reducing atmosphere.

Other heat treatments

Besides sintering, other heat treatments can be monitored in situ. Weight loss and dimensional changes during debinding provide information on how to optimize debinding cycles. Weight gain and optical inspection allow for the in situ measurement of infiltration processes.

The tasks

- Measurement of weight changes in controlled atmosphere.
- Determining the wetting behaviour of melts on solid substrates.
- Monitoring infiltration processes in situ.

Our solution: TOM-AC

TOM-AC is the combination of a high temperature (2000 °C) graphite furnace with an optical dilatometer. The crosslight silhouette of the sample is recorded by a CMOS camera. A special optical system provides an imaging without distortion even if the sample is displaced, e. g. due to thermal expansion.

Dimensional changes of the sample are registered by special image analysis software; the sample may be of any shape as long as its complete silhouette remains within the measuring window (diameter 50 mm). The volume of samples which are rotationally symmetrical can optionally be calculated.

Measurements are taken every second so that rapid changes can be registered. Furthermore, melting and wetting phenomena can be investigated by examining the wetting angles and infiltration kinetics.

TOM-AC is controlled by a standard PC and operated via comfortable graphical user interface. Besides the data on dimensional changes, saved as ASCII-files, single images and time-lapsed videos of the thermal treatment can be obtained. The resolution of TOM-AC is about 2 µm with very high reproducibility.