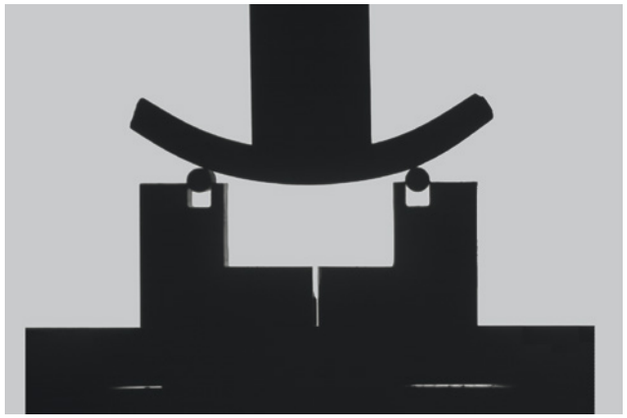

Service Offering

Fraunhofer Center HTL performs contract measurements. In addition, all TOM systems developed at the HTL are designed and distributed according to customer requirements.

Material Characterization

- Creep behavior and viscous parameters
- Wetting phenomena
- Oxidation processes

Process Analysis and Process Optimization

- Debinding
  - Weight curves
  - Cracking and deformation phenomena
  - Optimization of debinding cycles
- Sintering
  - Sintering curves and sintering kinetics
  - Deformation phenomena
  - Creep behavior
  - Optimization of sintering parameters

Fraunhofer-Zentrum HTL
is certified acc. to ISO 9001:2015

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Center for High Temperature Materials and Design HTL

ThermoOptical Measuring System TOM_air

TOM_air

TOM_air is a ThermoOptic Measuring system for material and process analysis in air up to temperatures of 1750°C. The system enables the investigation of a wide range of high-temperature phenomena with an optical beam path, a weighing and force unit and additional microphones. The focus is on questions of material characterization and process development, such as:

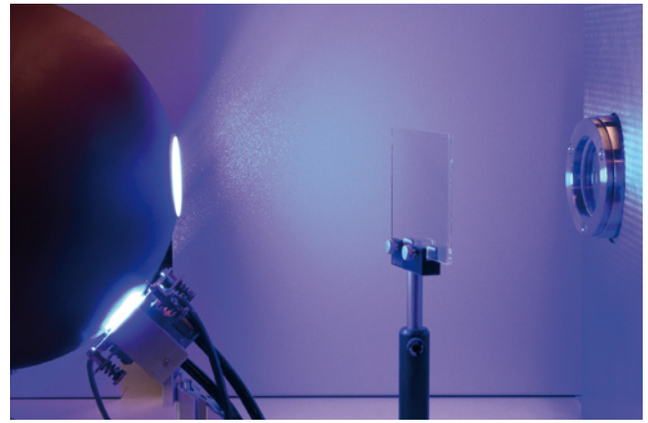
- Defect-free debinding of green parts with high binder content (injection molding, additive manufacturing)
- Shortened debinding cycles for large components
- Investigation of deformation phenomena during sintering, e.g. due to porosity gradients, interaction with kiln furniture or different shrinkage during co-firing
- Optimization of sintering curves with respect to energy balance and product quality
- Investigation of the creep behavior of high-temperature materials – also by means of supporting simulation
- Investigation of oxidation and wetting phenomena

Measuring Principle

TOM_air is equipped with a $MoSi_2$ heated chamber furnace which allows variable measurement arrangements of samples or small components. With a horizontal telecentric beam path and special image evaluation software, dimensional changes are recorded with high resolution and reproducibility.

By means of a weight sensor located above the measuring furnace, gas phase reactions of the sample can be investigated in a hanging arrangement. Additional microphones allow sensitive acoustic emission analysis, e.g. to register crack formation during debinding.

A uniaxial tension-compression device arranged in the vertical axis allows the investigation of creep phenomena. In addition, important viscous material characteristics can be determined for the simulation of component behavior at high temperatures.



Technical Data

- Maximum temperature: 1750°C
- Heater: MoSi2 SUPER-Kanthal
- Operating atmosphere: air
- Measuring resolution: approx. 0.1 µm
- Furnace window: 40 x 40 mm
- Fully automatic, software-controlled measurement sequences
- Up to 20 simultaneous user-defined measurands
- Weighing unit: maximum weight 200 g, resolution 0.1 mg
- Uniaxial tension-compression device for force range up to 4000 N
- 4 sound sensors for crack detection

The optical method can also be used to study wetting and melting phenomena as well as the behavior of soft materials such as glasses or slags.