



Service Offering

We offer services and R&D in the fields of destructive and non-destructive material testing. The focus here is on testing inorganic fibers for use as textile reinforcements. Testing of all other fiber types is also possible.

The test procedures are carried out in accordance with standards by experienced specialists. In close consultation with the customer, special test procedures can be adapted to customer-specific requirements.

The results are provided in the form of test protocols, image files and/or presentations as agreed with the customer. If desired, an interpretation of the measurement data with a detailed report is provided.

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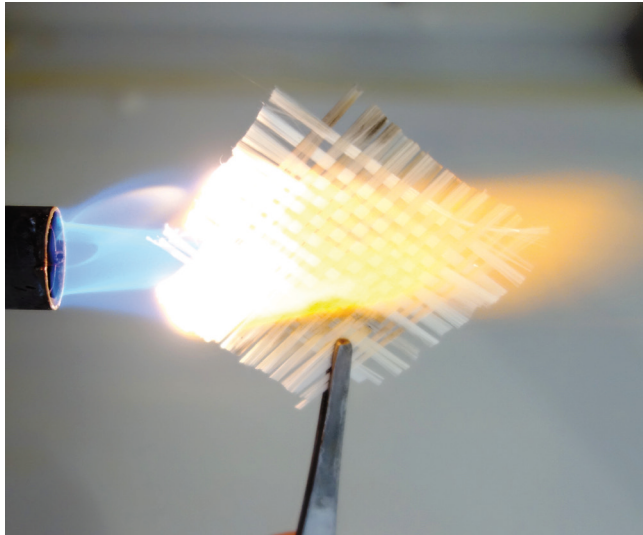
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Fraunhofer Center HTL is certified
acc. to ISO 9001:2015.

**Center for High Temperature Materials and
Design HTL**

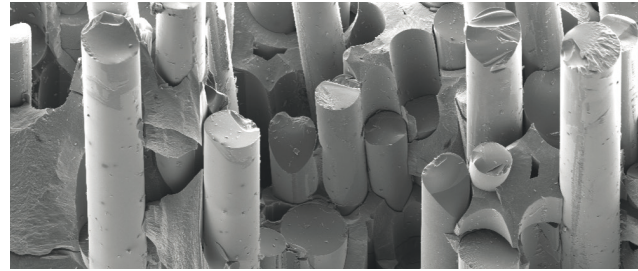
Testing on Inorganic Fibers



Testing on Inorganic Fibers

The more complex industrial manufacturing processes become, the more important it is to have reliable starting materials available for material production. Physical and chemical materials testing has therefore become an indispensable component of quality assurance.

In the case of components made of ceramic fiber composites (CMCs), product safety and homogeneity significantly determine service life. In order to avoid rejects during manufacturing, possible sources of defects in materials and process parameters must be reliably found. At Fraunhofer Center for High Temperature Materials and Design HTL and its Application Center for Textile Fiber Ceramics TFK, a variety of standardized and adapted tests are available for this purpose.



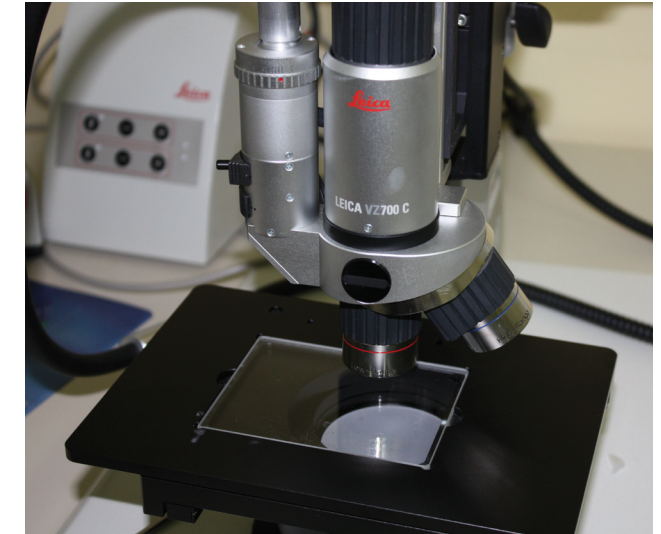
SEM image of a CMC structure

Material Valuation

- Digital microscopic analyses, e.g. to determine the phase composition
- Differential heat flux calorimetry (DSC)
- Infrared (IR) spectroscopy
- CT and SEM analysis

Testing Methods

- Method for testing fiber reinforcements, etc. in advanced ceramics / CMCs acc. to DIN EN 1007 (determination of sizing content, fineness, fiber diameter and cross-section, tensile properties and elongation at room and high temperature)
- Performance of yarn and heald abrasion tests
- Evaluation of the avivage effect
- Evaluation of the infiltrability of preforms
- Characterization of thermal stability of ceramic fibers in oxidizing atmosphere up to 1,750 °C or in inert or reducing atmosphere up to 2,100 °C
- Characterization of the chemical resistance of ceramic fibers to acids or alkalis as well as metallic melts
- Evaluation of corrosive fiber attack
- Determination of the creep deformation of ceramic fibers by means of the BSR test (Bend Stress Relaxation)
- Determination of the high-temperature tensile and creep strength of ceramic fibers in an inert gas atmosphere up to 1,500 °C



Equipment

Universal testing machines up to 100 kN for bending, tensile and compression tests

- Test speed 0.005 to 400 mm/min
- Tests at room and high temperature
- Testing of fibers, yarns, rovings and textile surfaces
- Video extensometer for strain measurement
- Application specific grips

Leica VZ700 C light microscope

- Incident and transmitted light device with magnification 35x to 2,450x
- Three objectives: 35x, 140x and 350x
- Polarized light
- Digital image acquisition and analysis