University of Augsburg, Institute for Material Resource Management

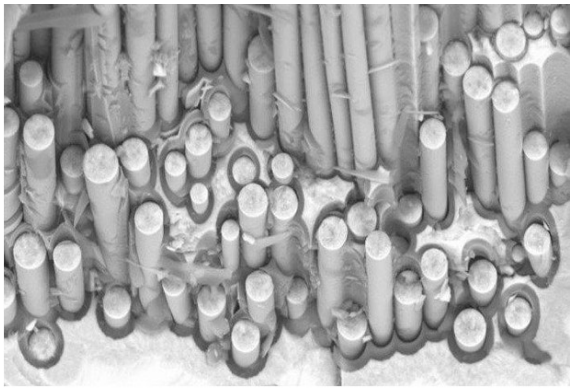
Die Uni Augsburg forscht in verschiedenen Bereichen zu CMC und CFK. // The university Augsburg conducts research into CMC and CFRP in various areas.

The chair "Materials Engineering" was newly founded in 2019 by Prof. Dr.-Ing. Dietmar Koch at the Institute for Materials Resource Management at the University of Augsburg.

It is dedicated to sustainable, digitally supported materials development and takes a holistic view of the structural and functional materials produced in the circular economy system: from production and the use phase to repair and recycling.

The central focus of the research at the chair is the reproducible and precisely de fined controlled production of CMC. This includes the entire process chain, from production to recycling. Material synthesis, energy- and resource-efficient ce ramic process technology, preform technology, shaping, property testing and life cycle assessment are important sub-aspects. The expertise at the chair is in devel oping customised materials for specific applications. Composites and hybrid structures with desired fiber architecture, hierarchical structure and adjusted pore morphology are produced on different scales. From the application scenario of a target component, the right material composition and combination are defined and then the component production is implemented technologically.

Important aspects are the ceramic process technology and the material science analysis of the ceramic materials, with a focus on the investigation of the fiber matrix interface as a function of the manufacturing process and the application conditions. Digital material development with predictable material properties is made possible through digital imaging of the material and cor-

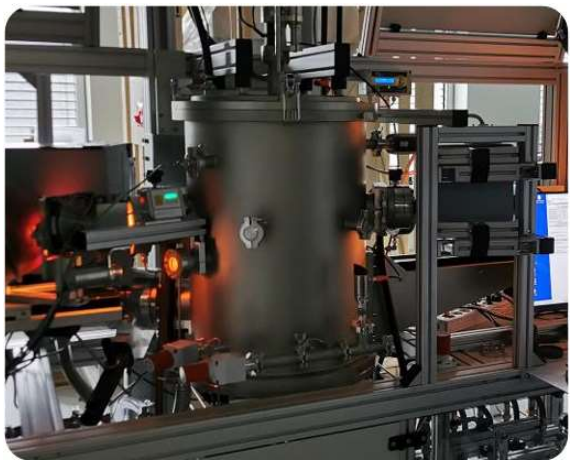


Fracture surface of a tough CMC @ DLR-BT

relation with its starting materials.

The entire process chain is controlled and measured using sensors so that all process data are available digitally. Furthermore, physical and mechanical

material data are recorded and subsequently evaluated using sophisticated measurement techniques such as push-out, 3D strain measurement, computer tomography and acoustic emission analysis. This makes it possible to generate process-structure-property relationships of customised as well as cycle-oriented heterogeneous materials. The lightweight design potential is developed by means of optimal design and multi-material design (saving resources). At the same time, material cycles are implemented (reusing re-



Diagbostic furnace for real and digital material development @ MRM

sources) and process chains for ceramic components are evaluated from raw material to end of life (analysing life cycles).