

## TESTING APPROACH TO NEW FIBRE-REINFORCED UHTC MATERIALS IN THE C3HARME PROJECT

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In space applications, very high temperatures are often a driving environmental condition for certain technologies. This is especially true for the engines of rockets and for re-entry systems where thermal protection is vital. With current state-of-the-art systems of both types, there are in some cases materials used which are simply consumed because temperatures are so high, there is no choice of a material able to withstand the conditions.

In order to overcome these restraints, Ultra-high-temperature ceramics (UHTC) provide an option in terms of the pure temperature capability of the material. However, bulk UHTC materials so far suffered from the problem of rather low mechanical properties and especially size limitations due to thermal shock sensitivity. If this situation could be improved by introducing a fibre reinforcement and combining the advantages of UHTC with the robustness of Ceramic Matrix Composites (CMC), the resulting UHTCMC materials could open up a whole new world of possibilities for new designs and flight regimes of the systems mentioned.

The C3HARME project aims at exactly that. The goal is to develop new fibre-reinforced UHTC types and to significantly improve the maturity of them to a level of TRL 5-6. In order to do so, the thermo-mechanical characterization of samples and components is of great importance. A multitude of different tests are done to get the full data set of all the relevant properties from room temperature up to very high temperatures as they are encountered in the application scenario. The talk will give an overview about the characterization strategy and the individual tests and facilities applied with some of the results already obtained.