

Scientists create a ceramic resistant to extreme temperatures

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Physicists and technicians of the TSU and Institute of Strength Physics and Materials Science SB RAS are developing experimental samples of ceramics resistant to extreme temperatures. The scientists aim to invent a material that can withstand up to 3,000 degrees Celsius. The new product will be used in the space industry and in the manufacture of aircraft engines. Samples of the material were presented at the Second International Conference and Expo on Ceramics and Composite Materials, held 25-26 July in Berlin.

This development is intended primarily for space and aviation. It will help to build a new generation of engines. Multilayer ceramics, in which the layers are different types of ceramics based on hafnium carbide and zirconium diboride and oxide, will increase the temperature in the combustion chamber of [jet engines](#). It also provides increased protection during atmospheric reentry.

Physicists and technicians plan to test their material at the Roscosmos State Corporation. The flow of plasma with hypersonic speed will be obtained in the special installation; a test sample of the multilayer [ceramic](#) will be used. If the object remains intact at least for 20 seconds upon exposure to 2,200°C during the first stage of the experiment, it will prove that the scientists are on the right track.

The new material will also have applications in diagnosis. It can be used in the manufacture of protective covers for temperature sensors in the combustion chambers of jet engines. The thermocouples with sapphire

tips currently in use cannot withstand the heat and fail.

The development of this new material is part of the Federal Target Programme (14.607.21.0056-RFMEFI60714X0056). The industrial partner of TSU is CJSC NEVZ-CERAMICS (Novosibirsk). The project cost about 50 million rubles. Scientists plan to finish work in December 2016.

More information: S Buyakova et al, The influence of ZrB-SiC powders mechanical treatment on the structure of sintered ceramic composites, *IOP Conference Series: Materials Science and Engineering* (2016). [DOI: 10.1088/1757-899X/140/1/012006](https://doi.org/10.1088/1757-899X/140/1/012006)

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