ТЕЗИСЫ ДОКЛАДОВ

**МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ
«Перспективные материалы с иерархической структурой
для новых технологий и надежных конструкций»**

**X МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ
«Химия нефти и газа»**

Томск

Издательский Дом ТГУ

2018

DOI: 10.17223/9785946217408/103

**THE TEMPERATURE DEPENDENCE OF THE STRENGTH CHARACTERISTICS OF
THE CERAMIC COMPOSITE $ZrO_2-Al_2O_3$ DURING THREE-POINT BENDING**

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Mechanisms of creation of ceramic composites with the set properties cause the greatest interest of applicability of a similar class of materials in elements of designs and the responsible mechanisms working in the conditions of a wide range of temperatures. It is known that the most significant factors affecting the mechanical properties are the porosity of the material[1,2]. Control of technological parameters of composite production, such as dispersion of the initial system of powder mixture and sintering temperature, allows to create products with a given porosity.

The aim of this work was to study the strength characteristics of a ceramic composite at three-point bending in a wide temperature range.

Prismatic samples from powder mixture of zirconium dioxide stabilized by magnesium oxide and aluminum oxide, pre-activated for 24 hours in a ball mill, were obtained as an object of research. The samples were obtained by pressing in molds followed by sintering at temperatures of 1400, 1500 and 1650 °C with high-temperature exposure for 1 hour.

Porosity of samples was measured by hydrostatic method in distilled water. The results of pore volume measurements were 21%, 11% and 6.5% for sintering temperatures of 1400, 1500 and 1650 °C, respectively.

The physical and mechanical properties of the samples were determined by testing them by a three-point bending method using the Instron ElectroPuls E1000 test system with a climatic chamber. The strength limit was determined at a loading speed of 0.3 mm/min.

The average values of the bending strength of the composite class under study in a wide temperature range are presented in table 1:

Porosity	21%	11%	6.5%
Test temperature			
–50 °C	23.49 МПа	80.49 МПа	127.17 МПа
24 °C	27.26 МПа	86.88 МПа	94.63 МПа
250 °C	19.79 МПа	52.49 МПа	78.43 МПа

The results of determination of the properties of porous composites showed that the samples with porosity of 21% have the lowest strength characteristics. It was found that the increase in the test temperature to 250 °C led to a decrease in the strength characteristics of composites for all types of samples, this is due to the presence of the tetragonal phase of zirconium dioxide and a decrease in the energy of the phase transition from tetragonal to monoclinic modification. For samples tested at temperatures below freezing there was also a decrease of the strength characteristics, however, for high-density samples there was an increase in the strength characteristics of ~30%

The reported study was funded by RFBR, according to the research project No. 16-31-60059 mol_a_dk.

This research was supported by the Russian Academic Excellence Project at the Immanuel Kant Baltic Federal University.

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