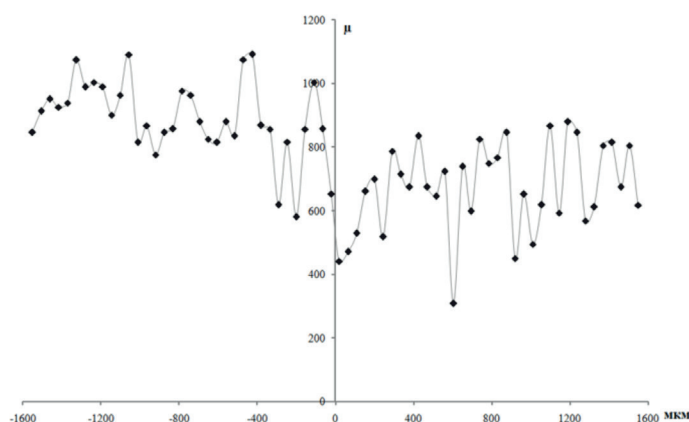


## MECHANICAL PROPERTIES OF TITANIUM CERAMICS FROM TITANIUM DIOXIDE OBTAINED BY OXIDATIVE CONSTRUCTION

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Rutile ceramics were synthesized using oxidative construction<sup>1</sup> at 750 and 875 °C for 210 and 158 days, respectively. Since the microstructure is not uniform across the sample thickness, a rutile sample was examined for the microhardness of a transverse cleavage for different stages of the kinetics of the oxidation process of titanium<sup>2</sup>. The microhardness was measured according to GOST 9450-76 on a Wolpert 402MVD hardness meter.



Picture 1. The microhardness of the sample of rutile obtained in 105 days at 875 °C. The plot was plotted from the center of the rutile sample to the surface. The center of the sample is taken as zero, on the left is the surface of contact with the metal, on the right is the surface of contact with air (oxygen).

In ceramics obtained at the linear stage of the kinetics of the oxidation of titanium, the increase in the oxide layer is carried out mainly at the metal / oxide interface without the formation of separate, distinct layers, which correlates with changes in the microstructure of the material. In this area of the sample, a decrease in porosity is observed, and the mechanical properties correspond to high microhardness values of 900-1000 MPa.

### References

1. Solntsev K.A., Shustorovich E.M., Buslaev Yu.A. Oxidative construction of thin-walled ceramics. Reports of the Academy of Sciences, 2001. T.378, №4, pp. 492–499.
2. Kovalev I.A., Zufman V.Yu., Shevtsov S.V., Ogarkov A.I., Shashkeev K.A., Ovsyannikov N.A., Chernyavsky A.S., Solntsev K.A. The microstructure of rutile ceramics, obtained using the approach of oxidative construction. Perspective materials, 2015, No. 6, pp.57-65.

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