QUALIFICATION of CERAMICs FOR THE PROTECTION OF ITER port plugs [[1]](#footnote-1)\*)

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One of the challenges for the ITER international fusion reactor under construction in France is the neutron protection of diagnostic equipment, especially in the vacuum part of the plant, directly adjacent to the hot zone of the reactor. The Budker Institute of Nuclear Physics has proposed to use boron carbide ceramics for neutron protection of the diagnostic ports developed by the Institute,
as they are lightweight, which is critical for ITER ports, and boron has a high neutron capture cross-section. However, during the conceptual design of the ITER vacuum chamber it was not intended to use B4C ceramics and it was not included in the ITER Vacuum Handbook. To confirm the possibility of using ceramics in the ITER vacuum chamber, it was necessary to test it.

Samples of ceramics manufactured by different methods were obtained from Russian manufacturers. The chemical composition, thermal and vacuum properties of ceramics were investigated. Vacuum tests and preparation for them were carried out according to ITER Vacuum Handbook requirements.

As a result of the carried out researches the possibility of work inside the vacuum chamber of thermonuclear reactor ITER of neutron protection on the basis of boron carbide ceramics is proved. Based on these experiments, reports were prepared and approved by ITER specialists. Russian manufacturers provided an estimate of the cost of ceramics for ITER ports.

At the Budker Institute of Nuclear Physics, a full-size model of a bronze tray with ceramics for the diagnostic and shielding modules of the ITER port-plugs was created and manufactured.
The mock-up was used to study the properties of this assembly and to evaluate the methods of manufacturing a large number of cassettes for ITER ports.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/E/ru/JA-Shoshin.docx) [↑](#footnote-ref-1)