

**TECHNOLOGY FOR PRODUCING COMPLEX-PROFILE PRODUCTS
BASED ON RADIOTRANSSPARENT CERAMICS**

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One of the priority areas of modern scientific research related to supporting the national security and defense capability of Ukraine is the creation of new functional materials based on ceramic compositions, as well as improving the technologies of their synthesis and formation in order to manufacture products for use in structural elements of modern military equipment operating in extreme conditions of temperature, pressure, and aggressive environments.

The work considered the technology for producing complex-profile ceramic products based on barium, strontium aluminosilicates and zinc silicate, and also determined rational methods for shaping semi-finished products.

The samples were manufactured using a two-stage ceramic technology, which included the following stages: the first stage is the synthesis of the target phase under specified technological parameters, the second stage is grinding of the synthesized material, manufacturing of a semi-finished product and firing at temperatures of 1200...1350 °C for 2...4 hours (depending on the selected phase).

Three molding methods were chosen for the research: semi-dry pressing, slip casting, and 3D printing. For semi-dry pressing, the synthesized crushed material was moistened with a CMC solution to a total mass humidity of 7...8%, pressed at a pressure of 20 MPa, however, the main disadvantage is the complexity of manufacturing the necessary molds and the limitation of the final geometry of the products.

To manufacture samples using 3D printing, the synthesized material was introduced into a polymer matrix and thoroughly mixed, samples were formed from the resulting mass by extrusion and dried until solidification. The main disadvantages of this method are increased porosity and reduced strength characteristics of the products due to the presence of clay components.

To obtain semi-finished products by the slip casting method from the synthesized crushed material, a ceramic slip with a humidity of 30% was prepared with the addition of a diluent in an amount of 0.1% by dry weight, the finished suspension was poured into plaster molds and left for a day for the shard to set, after which the workpiece was removed from the mold and dried to a residual humidity of > 1%.

According to the results of the conducted research, it was determined that the best properties were obtained by samples obtained by the slip casting method, which had the following indicators: water absorption – 1...2%, porosity – 1.5...3%, apparent density – 2.5...2.6 g/cm³.

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