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Investigation of Ordered Structures Formed on the Surface of Piezoceramic Elements

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The impact, by the ribbon-shaped electron stream on the surface of piezoceramic elements (ZTS-19 material), with, by the thermo-vacuum deposition formed on them, ordered structures, leads to the formation in the piezoelement of zones with dimensions $(220 \dots 280) \times (120 \dots 150)$ mkm with different values of the piezoelectric modulus d_{31} and the electro-mechanical coupling coefficient K , which allows to create a piezoelectric circuit, confining itself by the volume of a separately taken piezoelement.

Further study of such piezoelements showed that the influence of the electron beam on them leads to a decrease in the porosity of the surface by 3 ... 5%, as well as an insignificant increase in the microhardness by 0.5 ... 0.8 Mpa. At the same time, the coefficient of electromechanical coupling in zones A (the formed structure) and B (the basic material of the piezoelement), fig.1, was, respectively, 0.48 and 0.44, and the piezomodule d_{31} in zone A increased by $0,4 \cdot 10^{-6}$ cm/stV, while in zone B - practically did not change ($4,315 \cdot 10^{-6}$ cm/stV against $4,312 \cdot 10^{-6}$ cm/stV), which is characteristic for a piezoceramic system ZTC.

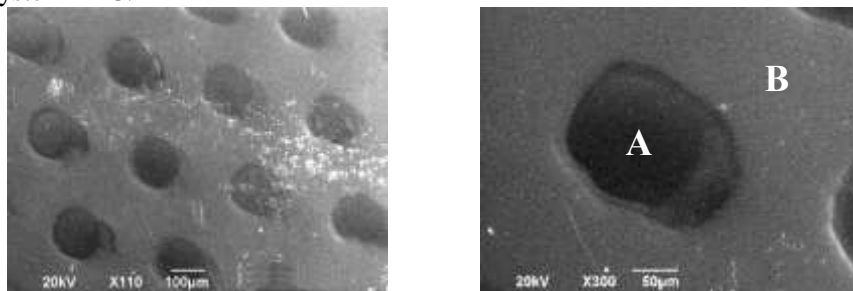


Figure 1 – Fragments of the surface of piezoelements with formed on them ordered structures by the combined electronic method. ZEISS EVO 50 XVP.

Based on the results obtained, it is further planned to study the dependence of the amplitude-frequency characteristics of piezoelectric elements obtained by the method described above, on the order and size of the ordered structures, and also, from the modes of impact on the surface of the piezoelectric element by the electron beam.