APPLICATION OF COMPUTER TOMOGRAPHY FOR INVESTIGATION OF POROUS STRUCTURE OF COPPER AS A COMPONENT OF COMPOSITE MATERIAL

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Rapid development in electrical engineering and other industries necessitates the creation of new materials with improved properties, particularly with low transient resistance and high electrodynamic stability. The aim of the study was to investigate the porosity of the created copper samples for an electrical conductive composite material [1].

There are several methods for analyzing porous structures, including microphotography, detection of water saturation in powdered materials, gas dynamic, ultrasonic, tomographic, and other methods. After analyzing the advantages and disadvantages of each method, computer tomography was chosen for studying the porosity of copper samples.

To create a complete three-dimensional image, a series of sequential two-dimensional X-ray images are taken as the object rotates 360 degrees. Then, using a sophisticated 3D reconstruction algorithm, a three-dimensional image is created. In addition to the outer surface, the reconstructed image contains all the information about internal surfaces and structure, as well as information about the fourth dimension - material density.

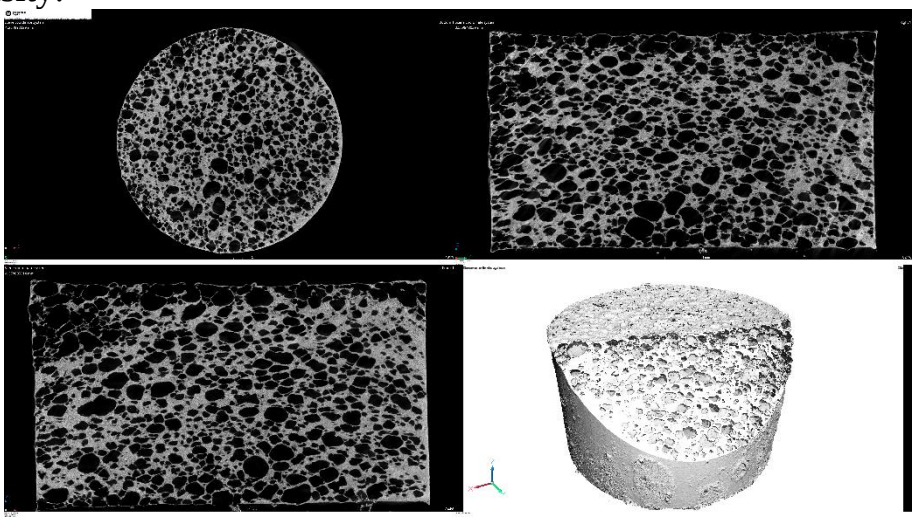

Figure – Distribution of pores within the sample volume, their arrangement, obtained using the Nikon ST H 225ST 2X Tomograph

Based on the research results, the porosity of a series of produced copper samples was analyzed. It was determined that the pores are evenly distributed throughout the volume, and the porosity coefficient varies in the range from 0.63 to 0.65.

References:

1. N.Hablovska, T.Pavlenko, G.Matula, D.Łukowiec. Rozwój i badanie nowych materiałów do styków w automatyce wyłączników z bezdugowym przełączaniem prądu // XVI Interdyscyplinarna Konferencja Naukowa TYGIEL 2024 „Interdyscyplinarność kluczem do rozwoju" 21-24 marca 2024r. C.145.