

INVESTIGATION OF CERAMICS BASED ON CU-SN POWDER, OBTAINED BY PLASMA DYNAMIC METHOD

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Composites based on copper matrix are of a great interest in various applications. Copper-tin alloys are intensively investigated due to their thermal and chemical stability in combination with good mechanical properties. This work shows the possibility to obtain Cu-Sn ceramics by spark plasma sintering using nanoscale powders consisting of copper and tin, synthesized by plasma dynamic method. This method is implemented by using coaxial magnetoplasma accelerator with copper electrodes and adding the solid precursor (tin) in the accelerator before carrying out the synthesis process. The synthesized Cu-Sn powders were investigated by X-Ray diffractometry and transmission electron microscopy. It was determined that the final material consists of phase $\text{Cu}_{41}\text{Sn}_{11}$. Using this product, the bulk ceramics samples were obtained by spark plasma sintering at different temperatures (150 °C, 250 °C and 500 °C). The changes in microstructure of copper-tin ceramics in dependence on the sintering temperature were also studied. After analyzing all ceramics samples by X-Ray diffractometry and scanning electron microscopy methods, it was found that the optimal temperature for sintering Cu-Sn ceramics, which was made of the powder synthesized by plasma dynamic method, was equal to 250 °C at pressure 60 MPa. At these conditions, the ceramics sample had the lowest porosity with the smallest grain size.

Keywords: *coaxial magnetoplasma accelerator, copper-tin, high conductivity, ceramics.*