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CHARACTERIZATION OF COPPER ALLOYS MANUFACTURED IN SEVOJNO COPPER MILL

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Abstract

Copper is widely used in electrical engineering for the production of conductors due to its excellent electrical and thermal conductivity, in the mechanical industry, construction, and architecture due to its high plasticity and the ability to produce a large number of technical alloys with good mechanical and technological properties [1]. In this research, we focused on analyzing various characteristics of copper and brass materials obtained at the Sevojno Copper Rolling Mill to better understand their properties and applications. These investigations included a range of techniques and methods, each essential to understanding different aspects of materials and their properties. In the first phase of the research, the chemical composition of each sample was analyzed. This analysis showed that the chemical compositions of the samples are very similar to those obtained at the Sevojno Copper Mill and at the Technical Faculty in Bor using the XRF method. The next phase of our research focused on a detailed analysis of the material's microstructure. Using optical and scanning electron microscopy with X-ray energy diffraction (SEM-EDS), we investigated how the material's microstructure develops depending on various factors, including chemical composition and thermomechanical processing. Using the light pulse method, we measured materials' thermal diffusivity, specific heat capacity, and thermal conductivity in a wide temperature range. Using DSC analysis, we investigated the thermal characteristics of copper and brass samples to determine the melting point and detect phase changes in the system. Measuring the electrical conductivity of the sample, it can be seen that pure, electrolytic copper has the highest electrical conductivity, almost 101%, according to the IACS standard. As the zinc content in the alloy increases, the electrical conductivity decreases. Microhardness measurement by the Vickers method: We observe that the sample (CuZn28) has the highest microhardness.

Keywords: *Copper, Brass, Microscopy, Conductivity, Microhardness*

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