



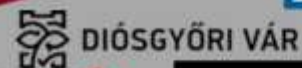
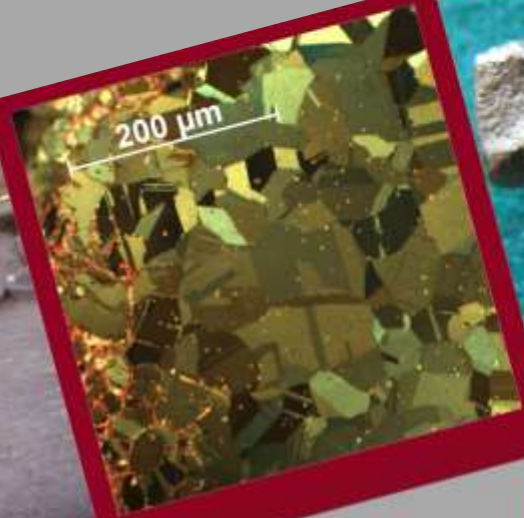
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Abstracts



THE STUDY OF THE CHEMICAL COMPOSITION OF PRODUCTS AND INGOTS OF NON-FERROUS METALS FROM THE TERRITORY OF THE MIDDLE VOLGA REGION OF THE FIRST MILLENNIUM AD

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Brass and bronze ingots used as foundry billets are known since ancient times throughout Europe and North Africa. They became even more widespread in the Late Roman time and reached their maximum in the Viking Age.

Possibly prototyped by Late Roman golden bars being collected as taxes, the non-ferrous ingots appeared in the Middle Volga region in the very beginning of the Migration period together with new groups of migrants from the South-West. Those ingots are of similar shape and weight, and were made in special casting molds in a shape of rods (sticks) with a triangular or quadrilateral section and look very similar to those that were in use on the territory of the Roman Empire. Once appeared in the region in the 3rd-4th c., they were in use during three centuries. To understand their functions and role in economic and cultural relations, we undertook a comprehensive study including examination of chemical composition, spatial and archaeological analysis. For the comparative analysis, we took over 100 non-ferrous items, mostly costume details, as well as 75 ingots from the sites of the Migration period.

Examination of the chemical composition was carried out by emission spectral and X-ray fluorescence analyses. The results of the research reveal four types of compounds: almost pure copper, bronze, lead-tin alloy and brass (copper + zinc) as the dominating one. The average quantity of zinc in the ingots ranges from 5.34% to 20.67%. The comparative analysis of the composition of ingots and casted items makes possible to suppose the brass ingots to be the main raw material for non-ferrous metalworking. Their origin and incoming routes of them is an issue for the forthcoming investigations.