## THE ROLE OF ELECTROLYTE COMPOSITION AND ELECTROLYSIS MODE ON HIGH-TEMPERATURE ANODIC SELECTIVE DISSOLUTION OF COPPER ALLOYS IN SALT MELTS

Karfidov E.A.,<sup>a, b</sup> Nikitina E.V.,<sup>a, b</sup> Kazakovtseva N.A.<sup>a</sup>

<sup>a</sup> Institute of High-Temperature Electrochemistry, Ural Branch of the Russian Academy of Sciences, 620990, Yekaterinburg, st. Akademicheskaya, 20, e-mail: karfused@mail.ru <sup>b</sup> Ural Federal University named after the first President B.N. Yeltsin, 620002, Yekaterinburg, st. Mira, 19

Oral Federal Oniversity numed after the first Frestdent B.N. Tellstn, 020002, Tekalerthourg, st. Mira, 19

In this work, the effect of the composition of a high-temperature electrolyte and the mode of anodic selective dissolution of samples of copper-based alloys on the final morphology was investigated.

The melt of chlorides (54.4CsCl-15.3KCl-45.3LiCl wt. % and 50LiCl-50KCl wt. %) of alkali metal and carbonate melt (40Li-<sub>2</sub>CO<sub>3</sub>-30Na<sub>2</sub>CO<sub>3</sub>-30K<sub>2</sub>CO<sub>3</sub> mol. %.) were chosen as electrolytes.

Copper-zinc (63:37 wt. %), copper-nickel (30:70 wt. %) and copper-aluminum (50:50 wt. %) alloys were used for the experiments.

The experiment was carried out in a three-electrode electrochemical cell under a high-purity argon atmosphere. Prepared sample of the alloy under study was used as the working electrode, the auxiliary electrode was high-purity copper, the reference electrode was silver chloride (in a molten chloride) and oxygen electrode (in a carbonate melt). The surface of the samples after oxidation was investigated using a «GEOL SM-5900 LV» scanning electron microscope.

The studies were carried out in galvanostatic and potentiostatic modes at temperatures from 623 - 923 K in order to select the optimum current density or applied potential.

It was found that the best final samples with the smallest pore size are obtained by selectively dissolving a copper-zinc alloy at a temperature of 623K in the CsCl-KCl-LiCl melt in the potentiostatic mode with an applied potential of +0.1 V.

The carbonate melt as a salt medium showed unsatisfactory results since it promotes the formation of oxide films on the surface of the samples, which impede the yield of the more electronegative component of the alloy.

With a decrease in temperature and with a decrease in the content of the electronegative component, the development of the surface layer, the number of pores increase.

The work was supported by the Russian Foundation for Basic Research, project № 17-03-00715 A.