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# Application of the general theory of disperse deposits formation in an investigation of mechanism of zinc electrodeposition from the alkaline electrolytes

Nebojša D. Nikolić[1,*], Predrag M. Živković[2], Jelena D. Lović[1], Goran Branković[3]

[1]ICTM – Department of Electrochemistry, University of Belgrade, Njegoševa 12, Belgrade, Serbia

[2]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, Belgrade, Serbia

[3]Institute for Multidisciplinary Research, University of Belgrade, Kneza Višeslava 1a, Belgrade, Serbia

Abstract. In this study, mehanism of electrodeposition of zinc from the alkaline electrolytes has been investigated using the general theory of disperse deposits formation. The exchange current densities in the range 18.4 – 88 mA $cm^{-2}$ were determined using new method based on comparison of experimental and simulated polarization curves, and the excelent agreement with the values found in the literature has been attained. Correlation between the polarization characteristics and morphologies of zinc deposits characterized by the scanning electron microscopic (SEM) technique was established. The spongy-like particles constructed from nano filaments and the large grains or boulders were formed in the zone of the fast increase of the current density with the overpotential before the plateau of the limiting diffusion current density was reached. The shape of dendrites, formed inside the plateau of the limiting diffusion current density and at the higher ones, strongly depended on overpotential of the electrodeposition. Mechanism of formation of all obtained forms was discussed by the consideration of the different rates of growth of surface protrusions in a function of the overpotential of electrodeposition through the analysis of the change of the ratio between the height and the radius of the protrusions. In order to confirm of the proposed mechanism, comparison with polarization and morphological characteristics of the other metals characterized by the different exchange current density values was made and discussed. Although zinc is classified in the group of the normal metals characterized by the high values of the exchange current density, it was found that the

*Corresponding author: Dr N. D. Nikolić; e-mail: nnikolic@tmf.bg.ac.rs; Tel/fax: + 381 11 337 03 89