

Nanostructures surfaces

Morphology of thin film coatings Fe-Co-W and Fe-Co-Mo

I.Yu. Yermolenko, M.V. Ved', N.D. Sakhnenko, Yu.I. Sachanova

National Technical University "Kharkov Polytechnic Institute", Frunze, 21,
Kharkov-61002, Ukraine.

E-mail: ntu_hpi16@ukr.net

Fe-Co-W and Fe-Co-Mo coatings were formed on a copper substrate from the citrate complex bath containing Fe(III) [1]. Electrolysis was conducted both in a stationary and pulse mode. The morphology of the deposits was investigated with a scanning electron microscope ZEISS EVO 40 XVP. The surface roughness was determined by a contact method using a scanning probe microscope AFM NT-206. Obtained 2D- and 3D-maps allow estimating the size of the crystallites, the degree of surface roughness and development.

Deposits of thickness 0.5–1.0 μm with microglobular structure and average grain size of 70–100 nm were obtained in galvanostatic mode. Increasing the current density contributes to the coatings enrichment by refractory components as

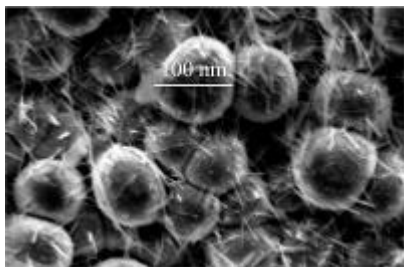


Fig. 1. Morphology of the Fe-Co-Mo coatings deposited in a stationary regime. Magnification $\times 2000$.

well as to increase grains size. It is shown that the use of non-stationary electrolysis allows to obtain nanostructured deposits with tungsten content of 6–11 at.% and molybdenum of 9–20 at.%. The wide range of the alloying elements content in the coatings determines integrated implementation in thin layers the magnetic, catalytic properties and the corrosion resistance [2, 3].

1. Karakurkchi A. V., Ved' M. V., Sakhnenko N. D., Yermolenko I. Yu. Electrodeposition of Iron–Molybdenum–Tungsten Coatings from Citrate Electrolytes // Russian Journal of Applied Chemistry.-2015.-**88**, N 11. P. 1860-1869.
2. Karakurkchi A. V., Ved' M. V., Sakhnenko N. D., Yermolenko I. Yu., Zyubanova S. I., Kolupayeva Z. I. Functional properties of multicomponent galvanic alloys of iron with molybdenum and tungsten // Func. Mater.-2015.-**22**, N 2.-P. 181-187. <http://dx.doi.org/10.15407/fm22.02.181>
3. Yar-Mukhamedova G., Ved' M., Sakhnenko N., Karakurkchi A., Yermolenko I. Iron binary and ternary coatings with molybdenum and tungsten // Appl. Surf. Sci.-2016.-**383**.-P. 346-352.