

Nanostructured surfaces

Nanoscale oxide PEO-coatings forming from pyrophosphate electrolytes

N.D. Sakhnenko, A.V. Karakurkchi, M.V. Ved, A.S. Gorohivskiy, A.V. Galak

National Technical University "Kharkiv Polytechnic Institute", Bagaliya Str. 21, Kharkiv-61002, Ukraine.

E-mail: anyutikukr@gmail.com

Plasma-electrolytic oxidation (PEO) of valve metals and their alloys is a promising method to obtain nanoscale functional materials with high mechanical, corrosion and catalytic properties. Significant demand and prospects of using PEO technologies contribute to the development of new non-toxic electrolytes and optimization methods for forming oxide coatings doped with additional components. Transition metals including Mn, Co, Zn, Fe and others are introduced to oxide systems to improve their catalytic properties [1, 2].

The most appropriate such mixed oxide coatings should be formed from pyrophosphate electrolytes containing salts of transition metals. The obtained non-stoichiometric oxide systems are characterized by uniformity, high adhesion to the base metal, transition metal oxides content up to 75 wt. % and have developed nanoscale surface (Fig. 1). Variation of electrolyte components concentration and PEO parameters allows you to control the composition, morphology and subsequently the catalytic activity of oxide systems.

Ti TiO _x ·MnO _y	Al Al ₂ O ₃ ·CoO _x	Al Al ₂ O ₃ ·CoO _x , MnO _y

Fig. 1. Surface morphology of oxide coatings

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