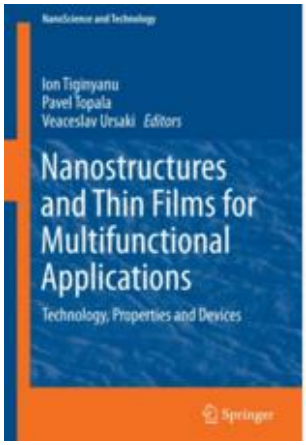

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Nanostructures Obtained Using Electric Discharges at Atmospheric Pressure

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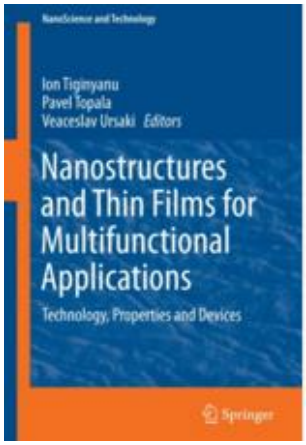
Abstract

The results of theoretical and experimental investigations of physical phenomena that accompany the formation of oxide and hydroxide nano-metric pellicles on metal surfaces by applying pulsed electrical discharge machining (PEDM) are presented. The chemical composition of the processed surface determined by Energy Dispersive X-ray analysis (EDX) attests the presence of oxygen that reaches the abnormal ammounts (up to 60 % at.) for all investigated alloys. The surface phase analysis using X-ray Photoelectron Spectroscopy (XPS) allows one to affirm that the oxygen in film forms three basic structures: –O2– (oxides), –OH– (hydroxides) and structures of C–O and O–C=O types. Experimental investigations have shown that the surface active resistance of these pellicles increases by about 107 times, the potential of corrosion increases to positive values and the speed of corrosion decreases in the chemically active media. Oxide pellicle formation occurs on flat, round and combined interior and exterior piece surfaces made of metal materials. It



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can be applied in oxide pellicle formation on piece surfaces aiming at providing anticorrosive protection; in surface passivation of construction pieces used in the chemical industry; in manufacturing active resistances of high values (106 Ω) and small dimensions (1 × 1 × 0.01 mm) used in microelectronics; in the production of elements with electronic emission surfaces.