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4th International Conference on
CRYSTALLOGRAPHY & NOVEL MATERIALS
&
9th International Conference on
BIOPOLYMERS & POLYMER SCIENCES
November 19-20, 2018 Bucharest, Romania

Synthesis and characterization of the complex nanostructured thin films based on titanium by Thermionic Vacuum Arc (TVA) method

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Nowadays, a great interest is paid on the development of plasma technology applications with particular emphasis on the fabrication of nanostructured thin film, combined with the study of applications of plasmas in nanotechnology. For this reason, plasma/surface interactions and growth mechanisms have to be taken into account for the definition, evaluation and comparison of the different types of coating equipment and achievable coating results. Titanium based nanocomposites owing to their remarcable properties of the coating surfaces such as wear resistance, roughness, low friction coefficients have been synthetized and investigated in different combination and forms, such as multi-component composites. The aim of this work is to find the best combination for coating the mechanical parts of components by suitable complex nanocomposites and by using innovative technology For instance, titanium nanocomposites are characterized by very high tensile strength even at high temperatures, light weight, high corrosion resistance, and as strong as steel, but 45% lighter. Binary, ternary thin films as well as single thin films were deposited using Thermionic Vacuum Arc (TVA) technology. The thermionic vacuum arc (TVA) is an original deposition method using a combination of anodic arc and powerful electron gun system (up to 600 W) for the growth of thin films from solid precursors under a vacuum of 10−6 Torr. For certain operating conditions the plasma source produce energetic ions without any additional ion acceleration means like acceleration grids or polarization systems. Results on the surface morphology and wettability of the obtained multifunctional thin films were reported by using: Transmission Electron Microscopy (TEM Phillips CM 120 ST, 100 kV), Scanning Electron Microscopy (SEM, Zeiss EVO 50 SEM) and Free Surface Energy (FSE) by See System. Nanostructured coatings with homogenous and dense surface without any faults (pinholes and cracks) were achieved at low temperatures to not affect the materials properties. Nanocomposite coatings of Ti based consisting of crystalline phase embedded into an amorphous matrix constitute a multifunctional coating architecture due to its combination of properties, suitable for emerging applications in metallurgical industry, yielding an enhanced corrosion resistance.

Biography

VLADOIU Rodica has completed his PhD at the age of 35 years from Bucharest University Romania. She was Head of the Physics Department between 2004-2006, Local Coordinator of the CEEPUS network from 2000, Member in the National University Research Council – CNCSIS in 2006, Member in the Scientific Commitee in International conference II CESPC Central European Symposium on Plasma Chemistry 2008, Brno, Czech Republic. She is co-author in 78 papers published in reviews with ISI quotation (428 citations) and in 2 national patents.In the last ten years, she was involved with the research team in 11 National Research projects and 9 International projects.

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