Nanotechnology Letters

Short Communication
Vol. 5, Iss. 3
2020

Nanomat 2019: Nanostructuration of biomaterials and materials by electrochemical methods - Lidia Benea - CC-ITES — Dunarea de Jos University of Galati, Romania

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Electrochemical methods for the preparation of high quality nanostructured surfaces and functionalization through active biomolecules electrodeposition are highlighted in this work. There are two applied electrochemical methods in our laboratory in order to obtain hybrid and nanocomposite structured layers or advanced functionalization of material surfaces. They are direct electrochemical synthesis by electro codeposition process and anodization of materials to controlled growth of nanoporous oxide films and the second method could be followed by electrodeposition of hydroxyapatite or organic compounds into porous films to form more complex hybrid layers. The main goal of the present paper is to make a summary of results obtained from applying electrochemical surface modification techniques in obtaining advanced functional surfaces and their properties characterization in terms of surface morphology and structure (SEM-EDX, XRD), the roughness and thickness, corrosion, tribocorrosion as well as the mechanical properties as nano hardness or wear resistance. Electrodeposition of metals and alloys or electro-codeposition of nano and microdispersed particles with metallic matrix to obtain micro and nano structured films and layers or hybrid coatings are a bottom-up approach of nanotechnology methods. Electrochemical oxidation or anodization to obtain thin films, layers of nano porous oxides, templates for nanowires or active biomolecules electrodeposition is a top down approach of nanotechnology method. Electrodeposition and the combination of electrodeposition with other electrochemical processes as controlled oxide growth by anodization can lead to a large class of hybrid layers and composite coatings or nanostructured layers (films) on different support materials and structures necessary for a future based on nanotechnology and nanomaterials to improve the surface functionalization of materials and to face of aggressive environments and degradation processes. Improving surface properties for corrosion and tribocorrosion of materials in specific environments give more valuable industrial and biomedical applications by increasing their life cycle.

This work is partly presented at joint event 18th Edition of International Conference on Emerging Trends in Materials Science and Nanotechnology, January 28-29, 2019 held at Barcelona, Spain