Abstract Template

Abstract Title: Towards controlled surface layer composition by electropolishing processes

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Abstract

This work is devoted to the review of the electropolishing processes with a focus on the controlled surface film composition gained during the electrochemical finishing treatments. The review commences with a standard electropolishing (EP) – with the random results obtained concerning surface film composition – through magnetoelectropolishing (MEP), high-current-density electropolishing (HDEP, and high-voltage electropolshing (HVEP), the processes allowing to take over control of the final results. Moreover, the HVEP appeared to be the step into a novel plasma electrolytic oxidation (PEO) processes performed in concentrated (85%) phosphoric acid (H_3PO_4).

The experimental results refer to metals and alloys of technical and biotechnical use, specifically from the group of biomaterials, such as austenitic stainless steels (AISI 304L, 316L, 316L VM), cobalt corrosion-resistant alloys, titanium (CP Titanium Grade 2) and most of its 2-, 3- or 4-component alloys (e.g. Ti6Al4V, NiTi). The findings aim at improving of the biocompatibility of implants by increasing their corrosion resistance, decreasing of hydrogenation, and a considerable growth of fatigue resistance after MEP. It was proved the mentioned electrochemical processes allow to both, removing some detrimental elements (e.g. Al, V) from the surface and/or introducing numerous important elements (e.g. copper, or calcium) into the surface film obtained. The last mentioned features may be gained both under HVEP and/or POE processing.

Keywords—*Electropolishing (EP), Magnetoelectropolishing (MEP), High-Voltage Electropolishing (HVEP), metals and alloys*

Professional Biography (100-150 words)

Tadeusz Hryniewicz has worked in the industry for about 4 years after studies, then completed his PhD at the age of 34 from Wrocław University of Technology PL, and postdoctoral studies from the University of California, Berkeley CA, conducting research at Lawrence Berkeley Laboratory CA, USA. Ten years after he obtained his DSc degree, and worked as a Professor at Koszalin University of Technology (KUT). He took part in many international programs, for over 15 years has been the coordinator of ERASMUS program at KUT. He has published more than 200 papers, almost haft of them in reputed journals, and has been serving as Editor-in-Chief to 2 intern. Journals, in 12 others as Assoc. Editor and/or Guest Editor, and in many editorial board member of repute. His papers appeared in 74 journal titles, and he has been serving as a reviewer to 69 scientific/technical journals.



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