P Jabłoński et al., J Material Sci Eng 2019, Volume 8
DOI: 10.4172/2169-0022-C1-125

Structure, physicochemical, and biological properties of gold-chitosan nanocomposite (CS_Au NPs) coatings deposited on shape memory NiTi alloy

P Jabłoński[1], M Ziąbka[1], W Niemiec[1], A Kyzioł[2], M Hebda[3], H Krawiec[1] and **K Kyzioł[1]**
[1]AGH University of Science and Technology, Poland
[2]Jagiellonian University, Poland
[3]Cracow University of Technology, Poland

Bio polymeric layers (e.g., chitosan, alginate) are widely investigated to be applied on the surface of implantological metals and alloys as a corrosion protection and foremost adding them additional antibacterial and antifungal properties. Nitinol is an alloy needing corrosion protection because of a high concentration of nickel (~50% w/v), that dramatically destroys the titanium oxide passivation film on the surface. Although usefulness of bio polymeric layers on NiTi alloy surface, the functionality of these coatings could be improved by addition of metal or/and metal oxide nanoparticles. Cu, Ag, and Au nanoparticles (NPs) provide a particular opportunity to enhance antibacterial properties of the resulting nanocomposite coatings due to well-known antimicrobial activity of metals nanoparticles. In this work, nanocomposite layers based on chitosan (CS) and gold nanoparticles (Au NPs) were proposed as an attractive approach in surface functionalization of NiTi alloy. Alloy substrates were pre-modified in piranha solution and/or plasma etched in RF reactor in Ar^+ ions. After that the samples were functionalized by immersion in the solution of CS_Au NPs. Microstructure, topography and atomic structure of the modified surfaces were characterized by scanning electron microscopy (SEM-EDX), atomic force microscopy (AFM), IR and Raman spectroscopy, respectively. A surface wettability and the selected mechanical properties were determined. Moreover, biological activity (incl. cytotoxicity) was evaluated *in vitro*. In addition, the corrosion properties of alloys before and after modification in the Ringer solution were investigated as well as the evolution of corrosion potential for TiNi alloy versus immersion time in Ringer solution.

Biography

P Jabłoński is a MSc student of Biomaterials and Composites Speciality at AGH University of Science and Technology. His part of the presented work was obtained within the implementation of his research project "Bioactive chitosan layers on the plasmochemical activated surface of NiTi alloy" under the supervision of DSc. PhD. Eng. Karol Kyzioł, who carries out the research on improving the surface properties of materials for implantology.

pjablo@student.agh.edu.pl

Notes: