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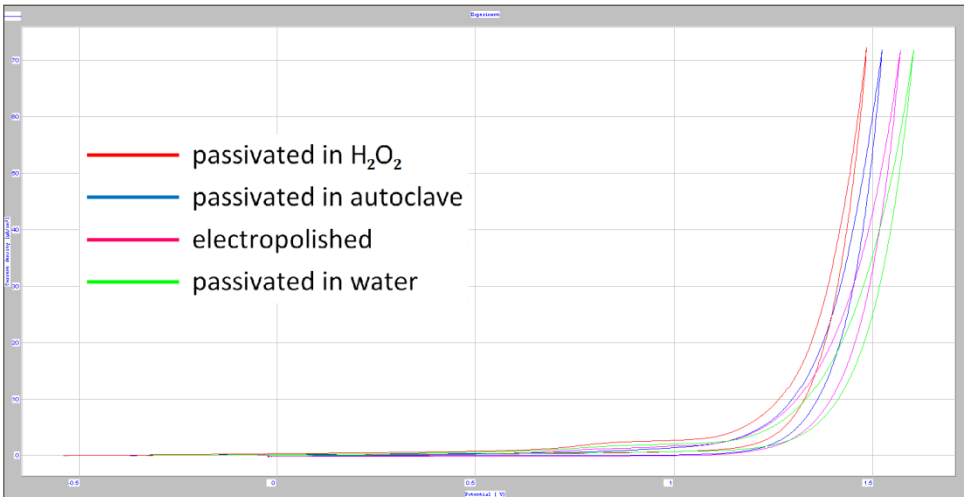
EVALUATION OF THE PHYSICOCHEMICAL PROPERTIES OF PASSIVE LAYERS PRODUCED ON NITI ALLOYS FOR USE IN THE CARDIOVASCULAR SYSTEM

Keywords: NiTi alloy, passivation, surface modifications, cardiovascular system

Implants made of NiTi alloy for use in the bloodstream should meet several strict requirements. In addition to good biocompatibility, they should be characterized by hemocompatibility, understood as the absence of harmful effects on blood morphotic components, and prevention of clot formation. Since the dimensions and shapes of the products made of this alloy are very small, the electro-polishing of samples in 3.5-mol H_2SO_4 solution was chosen as preliminary surface preparation. In this study, four methods of NiTi alloy passivation were compared: in boiling water, in boiling H_2O_2, in the autoclave, and in air, at temp. 450°C with an electro-polishing output state. Potentiodynamic, impedance and wettability tests were used to assess the surface prepared in this way.

The results of corrosion resistance tests in the environment of artificial plasma show that there are no significant differences in the methods of passivation compared to electropolishing. Therefore, it can be concluded that already during the electropolishing process a passive layer with very good biocompatibility is produced spontaneously and the use of additional passivation methods does not improve but also does not deteriorate the properties tested.

At a further stage of testing, it is envisaged to apply a layer to improve fluoroscopic visibility and to check which variant ensures the best adhesion of the coating while maintaining good hemocompatibility of the material.



Anodic polarization curves of various NiTi passivation methods