COMPOSITE FILM AS ANTICORROSIVE COATING OF Ti ALLOYS SURFACES

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Abstract
Causing important economic damages, the corrosion of the titanium alloys used in the different environmental or medical fields can be prevented by using a physical barrier with anti-corrosion properties. The anti-corrosive property of a film consisting of poly (methyl methacrylate) (PMMA) and ibuprofen (IBU) deposited by dip-coating on Ti alloy surface was investigated by electrochemical impedance spectroscopy method.

Introduction
The main important anticorrosive methods consist of the design of corrosion-resistant materials, the application of a film having anti-corrosion properties, the addition of corrosion inhibitors, and the use of cathodic protection. In this context, an innovative high-protective anti-corrosive strategy consists of using a composite matrix consisting of an inhibitor included in a polymeric film [1].

Experimental
Ti–6Al–4V/xIBU-PMMA (where x = 0.2, 0.4, 1 mM ibuprofen) modified surface was prepared by dip-coating method and was investigated into a 3.5% of NaCl saline solution by electrochemical impedance spectroscopy (EIS) measurements, using a PGStat 302N electrochemical workstation.

Results and discussion
In order to establish the steady-state open circuit potential (OCP) a stabilization period of 60 min was performed. The potentiodynamic polarization measurements were carried out over a potential range of ±200 mV *versus* OCP with a scan rate of 0.5 mV s^{-1}. From the obtained Tafel plots the estimation of the corrosion kinetic parameters, such as corrosion potential (E_{corr}), corrosion current density (i_{corr}), and anodic (b_a) and cathodic (b_c) Tafel slopes were performed. The EIS measurements lead to calculating the corrosion inhibition efficiency (IE%).

Conclusion
The corrosion inhibition performance of a Ti–6Al–4V/xIBU-PMMA (where x = 0.2, 0.4, 1 mM ibuprofen) interface in a 3.5% of NaCl saline solution was studied proving the inhibitory ability of ibuprofen.

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References

[1] E. Maya-Visuet, T. Gao, M. Soucek, H. Castaneda, *Prog. Org. Coat*. 83 (2015) 36-46.