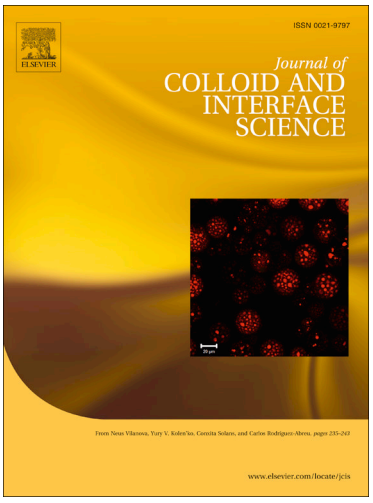

Corrosion resistance and antibacterial properties of polysiloxane modified layer-by-layer assembled self-healing coating on magnesium alloy

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Corrosion resistance and antibacterial properties of polysiloxane modified layer-by-layer assembled self-healing coating on magnesium alloy

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Abstract

Magnesium (Mg) alloys have shown great potential in biomedical materials due to their biocompatibility and biodegradability. However, rapid corrosion rate, which is an inevitable obstacle, hinders their clinical applications. Besides, it is necessary to endow Mg alloys with antibacterial properties, which are crucial for temporary implants. In this study, silver nanoparticles (AgNPs) and polymethyltrimethoxysilane (PMTMS) were introduced into AZ31 Mg alloys via layer-by-layer (LbL) assembly and siloxane self-condensation reaction. The characteristics of the composite films were investigated by SEM, UV-vis, FT-IR, and XRD measurements. Corrosion resistance of the samples was measured by electrochemical and hydrogen evolution tests. Antibacterial activities of the films against *Staphylococcus aureus* were evaluated by plate-counting method. The results demonstrated that the composite film with smooth and uniform morphologies could enhance the corrosion resistance of Mg alloys owing to the physical barrier and the self-healing functionality of polysiloxane. Moreover, the composite coating possessed antibacterial properties and could prolong the release of assembled silver ions.

Keywords: Layer-by-layer; Corrosion resistance; Antibacterial; Self-healing; Magnesium alloy; Silver nanoparticles.

1. Introduction

Magnesium (Mg) alloys have recently been a focus of biomaterials due to the notable biocompatibility and biodegradability [1-3]. And there remains growing interest in using Mg alloys in biomedical devices applications, such as orthopaedic

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