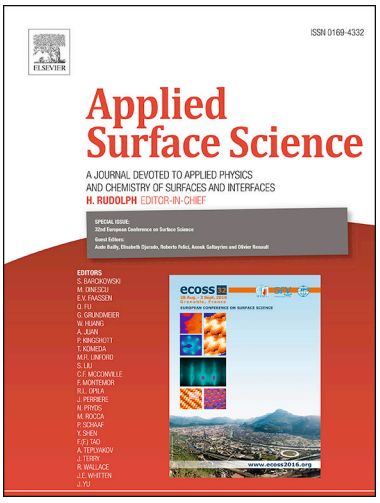


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PII: S0169-4332(18)32315-8
DOI: https://doi.org/10.1016/j.apsusc.2018.08.173
Reference: APSUSC 40210

To appear in: *Applied Surface Science*

Received Date: 3 May 2018
Revised Date: 4 August 2018
Accepted Date: 20 August 2018

Please cite this article as: S. Höhn, S. Virtanen, A.R. Boccaccini, Protein Adsorption on Magnesium and its alloys: A review, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.08.173

# Protein Adsorption on Magnesium and its alloys: A review

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## ABSTRACT

The interaction of biomaterials with the biological environment is based on the adsorption of proteins on the surface and the interaction with ions and water molecules to form various reactive interfaces. Understanding the protein adsorption mechanisms, kinetics and thermodynamics is essential to improve the design of new biocompatible materials and to control protein interaction with solid surfaces. Magnesium and its alloys are promising materials for biodegradable metallic devices due to several advantages, including reduced stress shielding effect in the case of orthopedic implants, and removing the requirement of a second surgery for implant removal. An appropriate protein adsorption on magnesium and Mg alloys is essential for applications in bone tissue regeneration and for the effective integration of Mg implants. In this review, we summarize and discuss previous studies on magnesium-protein interactions, including the adsorption of proteins on Mg surfaces as well as the influence of proteins on Mg corrosion. In most cases, the influence of protein adsorption on magnesium corrosion was determined using polarization curves, electrochemical impedance spectroscopy (EIS), and x-ray photoelectron spectroscopy (XPS). The results show inhibited degradation due to insoluble salt formation (barrier layer) or formation of unstable and porous layers followed by higher corrosion rates depending on the substrate (cpMg or alloys) and/or media. A comparison with the use of different solutions on the surface reactions (with and without proteins) is presented and the influence of corrosion layer formation is discussed. In this review, the influence of substrate and media on corrosion mechanism and protein adsorption on magnesium and magnesium alloys are highlighted, which significantly affect the in-vivo and in-vitro corrosion behavior which is of high relevance for the application of Mg and Mg alloys in medicine.

**Keywords:** Magnesium; Adsorption; Proteins; Interface; Corrosion