Corrosion and Nanomechanical Properties of Chitosan-based Coatings on Biodegradable Mg Alloys

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Abstract Mg alloys are promising biodegradable materials for implant applications. However, implant dissolution cannot occur too fast, as it would result in a dramatic decrease in implant stiffness before the completion of the healing process. Therefore, application of natural polymer coatings is promising for controlling and adjustment of the degradation profile of Mg alloys. In this work we utilized different types of chitosan coatings to control initial stages of degradation of Mg alloys AZ31 and WE43 in Hank's solution. A novel dynamic multisine electrochemical impedance spectroscopy approach is proposed to evaluate corrosion degradation of coatings in time. Moreover, nanomechanical properties of such coatings are of great significance for their application. Advanced nanomechanical characterization was performed by using multifrequency Intermodulation AFM (ImAFM) providing unique information on conservative and dissipation interaction energy components.

Keywords Corrosion; Mg alloy; Biodegradation; Chitosan; Nanomechanical properties

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