Bio Corrosion Evaluation of Organic Coatings on Magnesium Alloys for Cardiovascular and Orthopedic Applications

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Abstract: Biodegradable metals are a novel class of biomaterials which have promising interventions in the current biomedical world. Medical implants such as stents, bone screws and bone plates could be made by biodegradable metals. These implants would serve their purpose within the patient’s body and disintegrate harmlessly, eliminating a need for removal surgeries. Magnesium is a prime contender as a biodegradable metal due to its biocompatibility and biodegradability. Surface modification techniques are needed to enable its suitability for specific applications. For example, localized deliveries of drugs are needed from cardiovascular stents to treat restenosis while localized deliveries of antibiotics are needed from bone plates to treat post-operative infections. These surface coating techniques should not significantly change the underlying corrosion behavior of Magnesium while providing localized drug delivery. Organic coating such as self-assembled monolayers is a technique which could be used for localized delivery of drugs and antibiotics from the surface of magnesium. This research aims to evaluate the bio corrosion behavior of these organic coated magnesium alloys. The corrosion behavior of self-assembled monolayer coated magnesium alloy was evaluated using polarized and unpolarized methods in physiological conditions. These organic coated magnesium metals were subjected to electro chemical corrosion testing, mass loss analysis and hydrogen evolution testing. Comparison of the results obtained between the Organic coated magnesium and the control showed no statistical significant chances in the corrosion behavior. In summary, organic coated magnesium was studied for its bio corrosion properties and this study concludes that these organic coatings do not change the corrosion behavior of the underlying magnesium and thus could be used for modification of magnesium alloy for potential cardiovascular and orthopedic applications.

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