

Abstract

# Corrosion Properties of Biodegradable AZ31 and ZK60 Magnesium Alloys: In Situ Study <sup>†</sup>

Evgeniy Merson, Vitaliy Poluyanov , Dmitry Merson  and Pavel Myagkikh \*

Institute of Advanced Technologies, Togliatti State University, 445667 Togliatti, Russia;  
feanorhao@gmail.com (P.M.); vitaliy.poluyanov@gmail.com (V.P.); mersoned@gmail.com (D.M.)

\* Correspondence: d.merson@tltstu.ru

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**Abstract:** Biodegradable magnesium alloys are promising materials for application in medicine. The corrosion rate and type of corrosion are among the most important properties for this kind of materials. The fine-grained biodegradable alloys AZ31 (hot-rolled) and ZK60 (extruded) were studied in the present work with the use of in situ methods including the hydrogen evolution corrosion rate measurement and real-time surface observation as well as ex situ methods such as the weight loss assessment and the post-mortem examination by confocal laser scanning microscopy. The experimental methods included immersion test in SBF (0.9% NaCl aqueous solution) during 120 h with 37 °C with recirculating corrosion media. The hydrogen evolution was measured with a burette with a constant time interval of 1 hour. The real-time surface observation was carried out with a high-resolution camera. The measurement of pH level was done twice a day. Corrosion rate curves, 3D morphology of corroded morphology and video recordings showing evolution of corrosion damage have been obtained. As a result, ZK60 was found to be less corrosion-resistant and addicted to pitting corrosion, whereas AZ31 showed pronounced susceptibility to filiform corrosion.

**Keywords:** magnesium alloys; biodegradable materials; in situ investigation; corrosion rate; corrosion mechanism



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