

Article

# Corrosion properties of biodegradable AZ31 and ZK60 magnesium alloys: in situ study

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

<sup>1</sup> Institute of Advanced Technologies, Togliatti State University, 445667 Togliatti, Russia; d.merson@tltu.ru (D.M.); vitaliy.poluyanov@gmail.com (V.P.); mersoned@gmail.com (E.M.)

\* Correspondence: feanorhao@gmail.com

**Abstract:** Biodegradable magnesium alloys is promising materials for medicine application. The corrosion rate and type of corrosion are ones of most important properties for this kind of materials. Fine-grained biodegradable alloys AZ31 (hot-rolled) and ZK60 (extruded) were studied in present work with using in-situ methods such as hydrogen evolution corrosion rate evaluating and incessant surface observation and ex-situ methods such as weight loss and confocal laser scanning microscopy investigation. Experiment methodic include immersion test in SBF (0.9% NaCl aqueous solution) in 120 hours with 37 °C with recirculating corrosion media. Hydrogen evolution was measuring with burette with frequency 1 hour, surface observation made by high-definition camera, pH was measuring twice a day. Corrosion rate curves, 3D corrosion surface morphology and videos shown staging of corrosion damage were received. As a result, ZK60 is less corrosion resistant and addicted to pitting corrosion, whereas AZ31 shown filiform corrosion.

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

---