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Weight loss, corrosion resistance and biocompatibility of titanium oxide coatings on magnesium alloys

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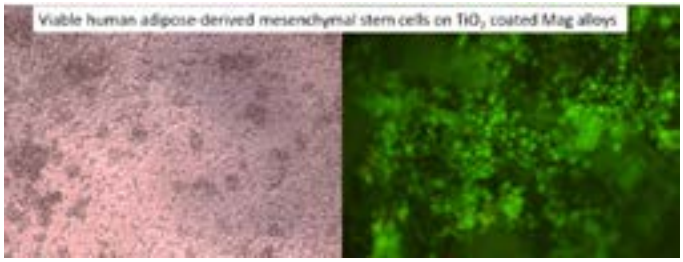
Titanium oxide (TiO_2) has been recognized as the active layer responsible for the good biocompatibility and osteogenic properties of the Ti-based medical alloys used for dental and orthopedic applications. Meanwhile, magnesium (Mg) and its alloys are currently widely researched for orthopedic applications, since their mechanical properties are more adequate to balance load transfer between bone and implant, but also due to its biodegradability. Extensive mechanical, *in vitro* and *in vivo* studies have been done to improve the biomedical performance of Mg alloys through alloying, processing conditions and surface modifications, including coatings deposition. The main purpose of such modifications is to extend the degradation rate of the alloy in order to match it with bone self-healing time. In this work, we are investigating the use of titanium oxide coatings deposited by physical vapor deposition techniques on high purity Mg alloys. These TiO_2 coatings have been extensively evaluated to demonstrate that independent of the substrate into which they are deposited, the coatings have the ability to promote the differentiation of mesenchymal stem cells into the osteoblast lineage, while improving the corrosion resistance of the uncoated metallic substrate and inhibiting bacterial adhesion. Here, we present the preliminary results of the corrosion resistance of the coated Mg-alloys in physiological fluids, their cell biocompatibility and weight loss kinetics.



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4. Argelia Almaguer-Flores, Phaedra Silva-Bermudez, Rey Galicia and Sandra E Rodil (2015) Bacterial adhesion on amorphous and crystalline metal oxide coatings. Materials Science and Engineering: C 57:88-99.
5. Kannan M B and Raman R K (2009) *In vitro* degradation and mechanical integrity of calcium-containing magnesium alloys in modified-simulated body fluid. Biomaterials 29(15):2306-14.

Biography

S E Rodil has bachelor and master degrees in physics from the National Autonomous University of Mexico (UNAM) and PhD degree from the University of Cambridge, UK. Her expertise in the development of surface modifications of metallic implants in order to improve the biological response. She has been particularly interested in the development of coatings to improve the osseointegration of metallic dental and orthopedic implants, aiming to find a solution that might also decrease the cost of the implants for their use in third world countries. She is a Professor at the National Autonomous University of Mexico, where she is involved in research and the preparation of the new generation of materials research students.

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