

Permanent Implants with Magnesium Surface

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ABSTRACT

Magnesium alloys have gained an increasing interest in medical applications due to their non-toxic degradation capacity as a novel biomaterial over the past decade. Especially the need for mechanically reliable and degradable metallic implant materials in orthopedic- and neurosurgery, with additional prospects in reconstructive surgery, has been driving the research interest on such materials. The corrosion resistance of magnesium alloys at physiological pH levels is limited. This seemingly disadvantageous feature of magnesium, with its already proven success for positive osteogenic effects, can be used as an advantage when degradable metallic implants needed.

The existing literature indicates that the dissolution rate of magnesium can be tailored according to the requirements. Furthermore, production of hybrid implants having magnesium alloy surface is feasible without impairing the non-toxicity of magnesium. Such hybrid structures may also be preferable as pure Mg can be used as an outer skin offering solely the benefits of Mg by avoiding the use of Mg-alloys and the so-far unknown effects of the intermetallic particles Mg alloys possesses.

This study presents the prospects of having hybrid implants composed of a degradable magnesium alloy surface and a permanent titanium alloy basis in order to use the beneficial effects of magnesium. Such a design requires indebt understanding and the use of special alloy composition and manufacturing techniques for a specific implant part.