

Biodegradable Magnesium Material

Stimulating bone growth by hydroxyapatite addition

Patent status:

EP 1962916 B1 (AT, CA, CH, DE) granted

CN 101330933 B granted

IL 191828 granted

JP 5372517 granted

Challenges

Medical surgery of any type always imply risks that need to be reduced. Especially in the case of implants, it is difficult to find the right materials that are accepted by the body. Implants for bone fractures that are used for adults are usually removed, when there are complications with the tolerability or mobility. In the case of patients in their growth phase the implant needs to be removed in a second operation, as soon as the bone fracture is healed.

Technology

Scientists from the Helmholtz-Zentrum Geesthacht used their expertise in the field of Magnesium and the processes handling to develop a magnesium material with hydroxyapatite as an additive. It is a cytocompatible biomaterial with adjustable corrosion and mechanical properties. Magnesium as a natural part of the bone is not rejected by the body and the high corrosiveness benefits the constant degradation process inside the body. Hydroxyapatite that is accounted for around half the skeleton, is used to stimulate the bone growth.

Areas of Application

Magnesium alloys with hydroxyapatite additives are developed for medical devices to fixate bone fractures. Bones screws and plates for children, adults and also for animals are possible. Other additives can be used to further accelerate the healing process and to adjust properties. Other purposes of use that do not need a permanent implant can be suggested and pursued.

Development Status

The technology has a TRL of 5, the proof-of-concept and the validation in the lab are done. *In vitro* studies proved the acclaimed properties and benefits. *In vivo* studies still need to be done to validate the technology for the relevant application.

Exploitation Opportunity

Helmholtz-Zentrum Geesthacht offers the described technology for in-licensing and/or for the further development and exploitation. Within the scope of a cooperation, interested companies can be supported in adapting this technology to their specific requirements.

Publication

F. Witte et al.: Biodegradable magnesium-hydroxyapatite metal matrix composites. *Biomaterials* 28 (2007) 2163-2174.



Bild: HZG/Carsten Neff

Advantages:

- No second surgery needed
- Tolerability of the implant
- Supporting the bone growth through hydroxyapatite
- High specific strength
- Not cytotoxic

Application:

- Biodegradable material
- Bone screws
- Hydroxyapatite
- Good mechanical properties
- High resource availability

Industrial Sector:

- Human medicine
- Veterinary medicine
- Surgery
- Traumatology
- Implants

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