Magnesium Composites for Biomedical Implant Applications

A magnesium composite based biomedical implant device with tunable degradability that is non-toxic

Georgia Tech and Drexel researchers have developed a method for processing a biocompatible magnesium composite material with a nano-particle halo-grain structure. The new thixotropic processing technique creates the novel composite structure. During processing nano-inhibitor particles, corrosion inhibitors, are introduced into magnesium. The combination of magnesium and the nano-inhibitor particles allows implants to achieve enhanced corrosion resistance and last sufficiently long in the body. The magnesium composite material also has a tunable degradation rate, allowing the body time to heal and recover naturally, with no toxic byproducts.

Summary Bullets

- **Biodegradable –** Healing process is not compromised by a permanent implant device
- **High Strength –** Mechanical properties match those of the natural skeletal structure
- **Reliable –** Decreases failure during or after installation

Solution Advantages

- **Biodegradable –** Healing process is not compromised by a permanent implant device
- **High Strength –** Mechanical properties match those of the natural skeletal structure
- **Reliable –** Decreases failure during or after installation
- **Non-toxic –** Anti-corrosion particles prevent toxic materials from diffusing into tissue
- **Tunable degradation –** Implant can be adjusted to allow the body to heal more naturally

Potential Commercial Applications

- Bone fractures fixation
- Ankle stabilization
- Replacement of intervertebral discs
- Cardiovascular inflation
- Stents

Background and More Information

Current materials for biomedical implants are either non-degradable or too weak. As a result, the healing process can be compromised; resulting in additional surgeries and increased pain to the patient. These devices are made of either non-degradable metals, which can cause tissue growth restriction and accumulation of metals in tissues, or are made of weak polymers, which often fail during installation or subsequent use. Magnesium is a promising material for implants because it degrades in body fluids and has mechanical properties that match those of the natural skeletal structures of the human body. However, magnesium devices degrade too rapidly and can diffuse toxic material into the body upon decay. Thus, there is a need for an implant material that is non-toxic, degradable, and strong enough to sustain in the body.

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IP Status

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