

MAGNESIUM BASED DEGRADABLE IMPLANTS FOR BONE DEFECT REPAIR APPLICATIONS

IITM Technology Available for Licensing

PROBLEM STATEMENT

- Repair of long segmental bone defects is challenging in orthopedic practice.
- There are different metal and alloys used in orthopedic implants for the replacement or regeneration of damaged hard tissue/bones.
- However, the use of permanent metallic implants causes **stress shielding** or **mechanical mismatch** or **release of toxic metallic ions** including chromium, etc. due to their **wear & corrosion** can happen.
- Hence, there is a requirement to address said issues by introducing biodegradable and biocompatible material.

TECHNOLOGY CATEGORY/ MARKET

Technology: Medical Based Degradable Implants;

Industry: Medical-Orthopaedic, Pharmaceutical;

Applications: Bones, Fillers, Nails, Plates, Orthopedics, Other;

Market: The global Medical magnesium Implants market is projected to grow at **CAGR of 9.8%** during forecast period **2023 to 2029**.

TECHNOLOGY

- The present invention describes a **magnesium alloy based medical implant** adapted to define **mesh cage** for **bone defect repairing with dip coating with nanocomposite of polymeric materials and Hydroxyapatite** followed by **electrospuncoating on the treated surfaces**.
- The **coating of polymeric materials and Hydroxyapatite** is formed by dipping implant in solution of polymeric materials and hydroxyapatite twice for achieving the desirable coating and drying under vacuum at room temperature.

IMAGES

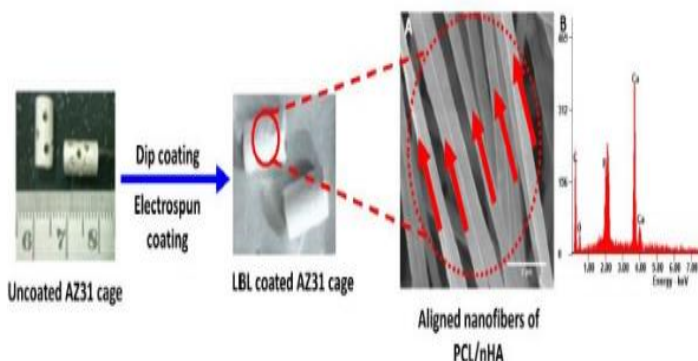


Fig. 1: Illustrates Fabrication of layer by layer nanostructured composite coated AZ31 mesh cage. A) SEM image and B) EDS of the coating

KEY FEATURES / VALUE PROPOSITION

- ❖ **Technical Perspective:** Present **method** includes **fabrication of magnesium-based implant** that specifically is suitable for **load bearing bone/skeletal bone** defect repair applications.
- ❖ **Industrial Perspective:** Nanocomposite coating in the form of **thin layer & nanocomposite nanofibers** on the implant that specifically suitable for **controlling the degradation of the implant cage**, thereby providing the adequate load bearing capacity until **new bone formation** in the defect region.

INTELLECTUAL PROPERTY

IITM IDF Ref. 1678;

Patent Application No: 201841009503

TRL (TECHNOLOGY READINESS LEVEL)

TRL- 3, Proof of Concept ready & validated

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IMAGES

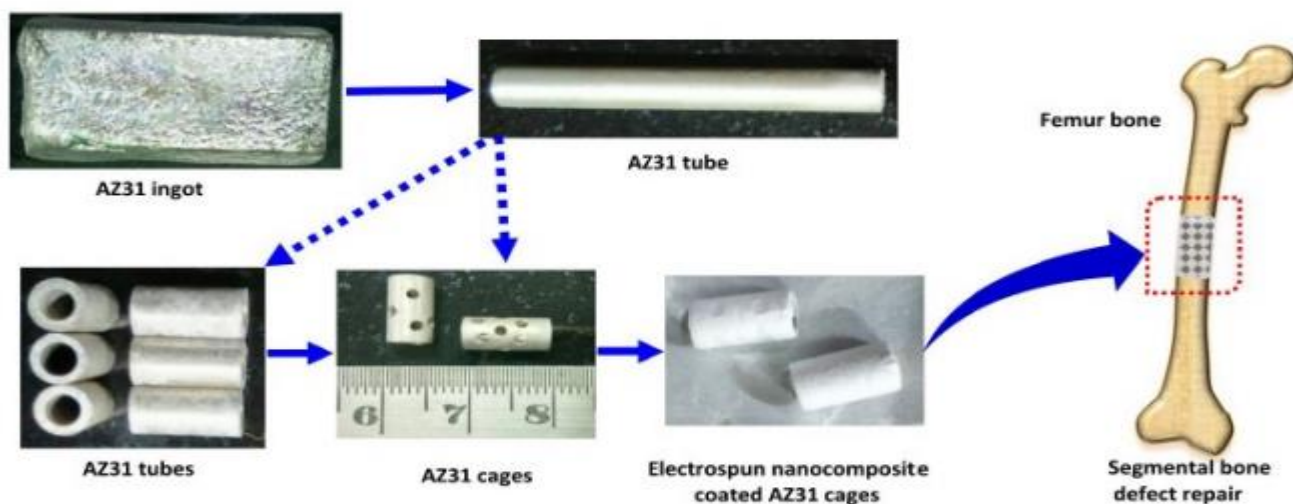


Fig. 2: Illustrates AZ31 magnesium mesh cage for bone defects repair

Experimental Result Images

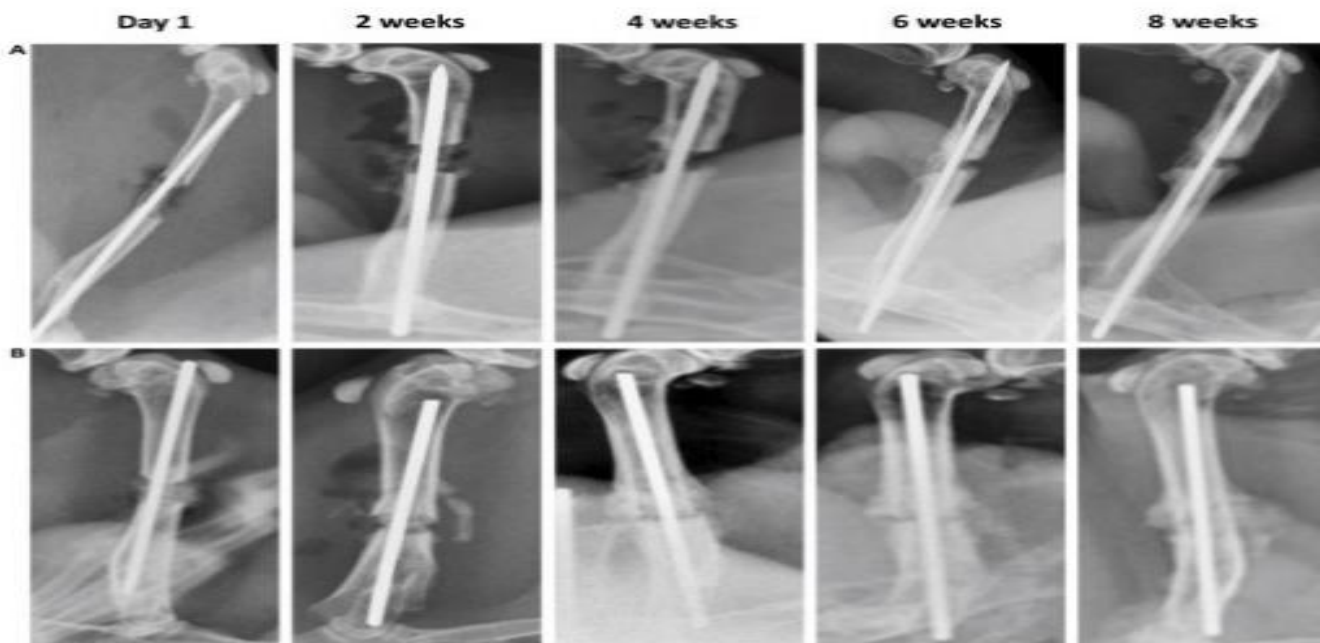


Fig. 3 : Illustrates Radiographic observation of the vivo **rabbit animals** after Day 1 and 2, 4, 6 and 8 weeks of A) Uncoated and B) LBL nanocomposite coated AZ31 cage. After 4 weeks of post implantation coated cage was showed callus formation and subsequent duration (6 and 8 weeks) complete bone healing achieved

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