UNIVERSITAT POLITÈCNICA DE CATALUNYA
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New inorganic cement for biomedical applications

A novel magnesium phosphate cement with good properties for clinical applications has been patented and developed. It is envisaged as an excellent root canal filler for endodontic treatments, improving the commercial materials currently used for this application. Partners to establish commercial agreements along with technical cooperation are sought.

The Challenge

Nowadays inorganic cements are commonly used for some orthopedic or dental treatments for replacement or tissue regeneration due to their inherent properties. In the field of endodontic treatments, the Mineral Trioxide Aggregate (MTA) is a commercial root -end filling material exploited for a nonsurgical endodontic management in dental injury. Nevertheless it presents some important drawbacks, namely a long setting time and a high cost. In civil engineering, Magnesium Phosphate Cements (MPCs) have been extensively used as fast setting repair of roads, industrial floors and airport runways. Their fast setting, high early strength, durability and adhesive properties are some of the most relevant features of these cements. However, their release of ammonium ions and their highly exothermic setting reaction could damage surrounding tissues, limiting their use in clinical applications. The challenge is to develop a new formulation of MPC to overcome the mentioned problems at the same time as their beneficial properties are maintained in order

The Technology

A novel magnesium phosphate cement formulation based on a magnesium oxide and a sodium (Na) phosphate mixture, with enhanced properties for clinical applications has been developed. The exothermia and setting kinetics of the new cement formulations were tailored to comply with clinical requirements. This novel Na-MPC has been characterized in terms of their reaction products, their microstructure and their mechanical properties. The MPC studied showed that early compressive strengths were substantially higher than that of MTA. The Na-MPC were shown to have antibacterial activity, which was attributed to the alkaline pH developed during the setting reaction. These materials can be prepared as granules, cements, coatings, or dense/porous ceramics among others.

Innovative advantages

- Easy preparation
- Fast setting
- High early strenght
- Stable with time
- Good sealing
- High adhesion
- High pH achieving an excellent antimicrobial effect

Current stage of development

Some properties have been tested *in vitro* with human teeth in collaboration with the School of Dentistry of the University of Minnesota. *In vivo* biocompatibilities studies are currently in process.

Applications and Target Market

- Technology of interest for companies devoted to biomaterials manufacturing for hard tissue regeneration in biomedical applications such as odontology and bone surgery.
- Relevant in endodontic applications, as a root canal filler or root canal sealer.
- Useful for filling bone cavities, bone fractures stabilization or anchoring dental prosthesis.
- Also usable for drug delivery systems and tissue engineering scaffolds.

Reference number

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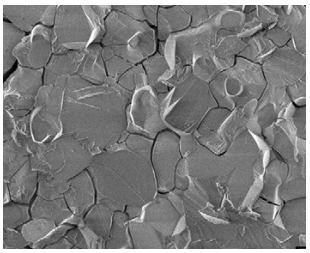
New biomaterial for hard tissue regeneration

Useful for nonsurgical endodontic treatments and an alternative to MTA commercial material



Stable material, good sealer, adhesive and with potential antibacterial activity.

Business Opportunity

Technology available for licensing with technical cooperation

Patent Status

US and European patent applications

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