# Weight Bearing Shape Memory Polymers for Minimally Invasive Spinal Implants

Patents Issued 3

## Background

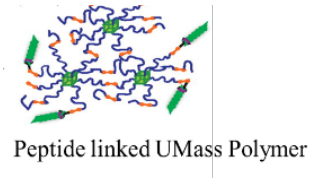
In US 650,000 to 700,000 spine surgeries are performed every year. Out of which, 352,000 were interbody fusion surgeries, most common amongst all the spinal procedures

Currently, the vertebrae are fused together using spinal implants in an invasive surgery. These procedures often need repeat surgeries because of poor implant fixation and resorption into bone.

Thus, there is a need for minimally invasive implants with improved outcomes.

## Technology

To address these problems, Dr. Jie Song at UMass Medical School has developed a platform of Polyhedral Oligomeric Silsesquioxane nanoparticle-based or all-organic polymer-based homogenous shape memory polymer (SMP) composites. They exhibit stable temporary shape fixation at room and body temperatures, and rapid (in seconds) and complete shape recovery slightly above (<50 °C) physiological temperature.




*Versatile shape memory polymer network for delivery of bioactive molecules*

In a number of elegant studies, UMass researchers have shown that a class of thermoset shape memory polymers are capable of exhibiting GigaPascal storage modulus at body temperature and their superior weight-bearing and shape memory performances are retained upon tethering with biological signals.

Further, these grafts show broadly tunable *in vivo* degradation rates and they exhibit biocompatibility comparable to resorbable sutures.

## Application

Our minimally invasive polymeric implant materials are suitable for:

- Spinal fusion
- Limited intercarpal fusion
- Mandibular defect reconstruction
- Dental bone reconstruction

## Market Potential

The Global Spinal Implants Market is expected to exceed more than US$ 19.5 Billion by 2024 at a CAGR of 7% in the given forecast period (Market research engine).

## Salient Features

**Weight Bearing** provides superior mechanical strength required for weight-bearing applications.

**Safe Trigger Temperature** provides ability to activate efficient shape recovery without tissue damage.

**Programmable Shape Memory** allows a surgeon to customize its shape for a bone defect.

**Biofunctionalization** covalent immobilization of proteins and biomolecules.

**Tunable Resorption of** polymer enables its replacement by new bone in patient-specific and defect-specific rate.

## Business Opportunity

UMass Office of Technology Management (OTM) is seeking interest from parties for licensing and/or sponsoring collaborative research to develop, evaluate, or commercialize this technology.

## Contact

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