Inorganically Surface Modified Polymers for Orthopaedic and Spinal Implants

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BACKGROUND

PolyEther EtherKetone (PEEK) is increasingly being used in spinal implants and investigated as a biomaterial for orthopedic implants because of its mechanical toughness, resistance to thermal and chemical degradation, and non-toxicity. Its main advantages over titanium are its x-ray translucence and elastic modulus similar to that of bone. PEEK can be easily viewed with radiography and magnetic resonance to assess implant positioning and stability. It reduces stress shielding in bone and bone resorption, which are common problems from implanted metals with mismatched elasticity properties. PEEK is only now beginning to be explored as a material for joint replacements. It has been shown as an excellent material for articulation in the joint; however, it does not interface well with bone. There is a need for chemically or micro/nanostructurally modified PEEK surfaces that adhere strongly to the PEEK substrate and bond well with bone.

TECHNOLOGY DESCRIPTION

University researchers have developed surface-nanopatterned polymers for implant applications, in particular, PEEK materials modified to exhibit nanostructured surfaces that promote osseointegration. Surface modification is done by coating the polymer with biocompatible metals, alloys, and oxides that are nanostructured by various means. Whereas polymers integrate poorly with bone, the invention's nanostructured coating enhances cell adhesion and promotes preferential stem cell differentiation to bone cells. The invention thus enables use of elastically bone-like and x-ray translucent PEEK for knee prostheses and other joint replacements or bone-anchored implants, e.g., hip and shoulder replacements and dental implants.

INTELLECTUAL PROPERTY INFO

The technology has a patent pending and is available for licensing and/or sponsorship.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,555,159	01/31/2017	2010-337
United States Of America	Issued Patent	9,005,648	04/14/2015	2010-337

CONTACT

University of California, San Diego
Office of Innovation and Commercialization
innovation@ucsd.edu
tel: 858.534.5815.

OTHER INFORMATION

KEYWORDS

PEEK, polymer, biomaterial, orthopedic implant, spinal implant, dental implant, osseointegration

CATEGORIZED AS

- **Medical**
  - Devices
- **Nanotechnology**
  - NanoBio

RELATED CASES

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