

# KUIC Technology Profile

## Microsphere-based Gradient Plugs for Osteochondral Regeneration

### Summary:

Implantable biomaterial for promoting bone and cartilage regeneration in joints following articular cartilage injury, a leading cause of advanced osteoarthritis.

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### Overview:

With a rapidly aging population, increasing obesity rates, and more frequent orthopedic procedures in younger patients, there is a great need for innovative methods of treating articular cartilage injuries. Articular cartilage cushions the joints of the body. Left untreated, damaged articular cartilage does not heal and injured joints become stiff, painful, and susceptible to debilitating osteoarthritis. Microsphere-based gradient plugs solve this problem by forming a seamless, integrated surface across damaged cartilage, providing the stability and scaffolding necessary for tissue regeneration.

### Applications:

Osteochondral tissue regeneration, osteoarthritis prevention.

### How it works:

Microsphere-based gradient plugs are macroporous, bioresorbable, mechanically robust scaffold biomaterials arranged in a continuous compositional gradient to form seamless, integrated interfaces. Arrangements of bone-promoting and cartilage-promoting microspheres offer superior mechanical integrity and the scaffold design allows for cell and nutrient infiltration. Once in place, the plug stimulates natural regeneration of the damaged tissue—regeneration that would not otherwise occur.

### Benefits:

End-users are seeking less invasive therapies for shorter patient recovery times and better patient outcomes. Osteochondral regeneration using microsphere-based gradient plugs results in faster healing time compared to other conventional biomaterials. They can be implanted in one short outpatient arthroscopic surgery, which does not require any special physician training to perform. After surgery, the material will support weight-bearing activity as soon as the patient is ready to walk.

### Why it is Better:

There are no products or biomaterial plugs currently US FDA approved for osteochondral regeneration.

### Other applications:

The scaffold material design would allow for the future incorporation of pharmaceuticals, biologics or cultured cells to be encapsulated within the microspheres.

**Patents:** [8,277,832](#)

**Additional Web Content:** Inventors: [Michael Detamore](#)

**Tags:** Orthopedics, Tissue

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