PURDUE INNOVATES | Office of Technology Commercialization

Beta-Ti Orthopedic Bone Staple Expansion Device

Nickel-free orthopedic staple system reducing allergy risks while preserving shape-memory healing benefits.

Orthopedic bone staples which compresses two bone members together to allow for contact and advanced healing following fracture fixation operate via a shape memory alloy, often nitinol. Nitinol is comprised of 55% Nickel and 45% Titanium. However, 1 in 5 individuals experience a Nickel allergy leading to pain, inflammation, and occasionally staple removal. A new Beta-Ti Alloy, made by Fort Wayne Metals, has the same super elastic and shape memory properties as Nitinol, but it is Ni-free free providing a hypoallergenic solution for individuals with sensitivity. B-Ti has a slightly lower strain capacity than Nitinol and thus to be effective in clinical settings must undergo expansion via a different method than the current, on-the-market bone staple expansion devices operate. Researchers at Purdue University have developed a Beta-Ti orthopedic bone staple expansion device that allows for successful use of this new Ni-free Alloy to minimize the occurrence of surgical complications and patient sensitivity.

Technology Validation:

By integrating a rotatable shaft with a dual-threaded design and synchronized movements of the plunger and retainer arms, the device provides balanced forces that minimize strain on the staple and surrounding structures.

Advantages:

-Allergen-free

-Reduces post-op complications of pain and inflammation following sensitivity

-Reduces the need for secondary procedures to remove discomforting staples

Technology ID

2025-HOSS-70993

Category

Materials Science & Nanotechnology/Biomedical & Bioinspired Materials

Digital Health & Medtech/Implantable Medical Devices

Authors

Isabelle Baggio

Mohammed Fahim Hossain

Emily Jayne Linder

Karthik Rajesh

Nicholas Woods

Further information

Patrick Finnerty

pwfinnerty@prf.org

View online

Applications:

-Orthopedic bone staple expansion

TRL: 3

Intellectual Property:

Provisional-Patent, 2025-01-31, United States

Keywords: Agriculture, Biotechnology, Bone Staple Expansion, Fracture Fixation, Nickel Allergy, Orthopedic Surgery, Shape Memory Alloys