Shape-Memory Polymers: A Powerful Alternative

James Henderson

Associate Professor and Bioengineering Graduate Program Director, Biomedical and Chemical Engineering and the Syracuse Biomaterials Institute

CURRENT RESEARCH

Polymers with shape-changing programmability for tissue engineering and regenerative medicine

Orthopedic injuries are a common cause of disabilities for soldiers, veterans, and civilians; and such injuries are extremely difficult and costly to treat. Regardless of the cause -- whether by trauma or congenital deformity from birth -- orthopedic disabilities induce substantial discomfort and loss of functionality, and advanced treatments are critical for improving patients' quality of life. Dr. James Henderson, Associate Professor of Biomedical and Chemical Engineering at Syracuse University, brings shape-memory polymers in vitro and in vivo to study mechanobiology and to develop new strategies for tissue engineering and regenerative medicine, with the goal of increasing the speed with which these injuries can be treated. Through novel methods of grafting and stabilizing complex fractures with these unique biomaterials, Dr. Henderson hopes to help people achieve a higher level of function more rapidly as they return to normal activity and to reduce pain, inconvenience, and cost.

Shape-memory polymers (SMP) have the ability to ''memorize'' a permanent shape, which can then be heated, elastically deformed, cooled and "fixed" into a temporary shape though an immobilizing transition and then later recover to the permanent shape through a triggering event, like heating or hydration. Dr. Henderson's interdisciplinary team and collaborators focus on understanding the mechanobiology of tissue development, maintenance, and disease progression, and exploiting the SMP technology to incorporate this understanding in tissue-engineering and regenerative medicine approaches. His work, therefore, has the potential to lead to improvements in clinical practice that may achieve faster outcomes with fewer surgeries,...

Read More at benefunder.com/

AFFILIATION

Syracuse University

EDUCATION

- Postdoc in Biology and Orthopaedics 2008,Case Western Reserve University
- Ph.D. & M.S. in Mechanical Engineering (Biomechanics) 2004,Stanford University
- B.S. in Mechanical Engineering 1999,Rice University

AWARDS

- Defense Advanced Research Projects Agency (DARPA) Young Faculty Award, 2012
- College of Engineering and Computer Science Faculty Excellence Award, 2010
- New Investigator Recognition Award (NIRA), 2007
- Arthritis Foundation Postdoctoral Fellow, 2006-2008
- Aspiring Investigator Award, 2005
- and 1 more...

RESEARCH AREAS

Life Science, Musculoskeletal, Regenerative Medicine, Veteran's Causes

FUNDING REQUEST

Your contributions will support Dr. James Henderson's wet lab based research at Syracuse University as he studies mechanobiology and brings new, transformative tissue engineering approaches toward clinical applications. Donations will help fund the $100K/year per project required to support consumables and personnel for in vitro and in vivo work, and $300-400K/year to make more immediate and substantial progress toward translation. Partner with Dr. Henderson to provide novel ways for treating fractures!