Skysong Innovations

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Nanocomposites as Adhesives for Laser-assisted Tissue Welding

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Inventors

Kaushal Rege
Assistant Professor
Chemical Engineering Department
Arizona State University

Huang-Chiao Huang
Graduate Research Associate
Chemical Engineering Department
Arizona State University

Invention Description

Conventional suture techniques suffer many drawbacks in terms of inflammatory responses, delayed healing and scar tissue formation. For these reasons, sutureless methods are rapidly gaining popularity as an effective alternative. Laser-assisted tissue welding (LTW) is one such sutureless method that provides immediate, scar-free fluid-tight sealing, accelerated healing and fewer complications all while reducing overall operation time. However, LTW is not without its own drawbacks, especially regarding insufficient wound closure strength. While there have been various protein-based solders (incorporating light absorbing chromophores) designed to address this issue, they bring about their own complications with stability and thermal damage to adjacent tissue.

Researchers at Arizona State University have developed novel elastin-like polypeptide hybrid gold nanorod (ELP-GNR) nanocomposites for laser-assisted tissue welding which overcome many of the drawbacks of current LTW solders. These nanocomposites have better chromophore stability, photochemical stability and minimum diffusivity. The required laser dosage using these nanocomposites is 10-to 25-fold lower than with light absorbing dyes, with increased biocompatibility and low immunogenicity. Moreover, the researchers have demonstrated that the ELP-GNR nanocomposites allow for laser-activated drug release and cell culturing capabilities.

These novel ELP-GNR nanocomposites result in reduced operation time, enhanced mechanical integrity of the weld site and drug release and cell culture capabilities, which could potentially revolutionize the sutureless wound closing industry.

Potential Applications

- Dressing for laser-assisted tissue welding
  - Cellularized (fibroblasts, stem cells etc.) and non-cellularized
- Laser activated release of drugs/small molecule therapeutics

Benefits and Advantages

- Better chromophore and photochemical stability
- Minimal diffusivity
- Reduced peripheral tissue thermal damage - 10-to 25-fold lower laser dosage
- Increased biocompatibility and decreased immunogenicity
- Controlled drug release - antibiotics etc., to enhance wound healing
- Cell culturing capabilities to improve wound healing
- Simple preparation methods

Intellectual Property Status:

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Contact

Thomas Goodman
Vice President of Life Sciences
Skysong Innovations LLC (SI)
P: 480.884.1648
C: 480.622.5630

Tom.Goodman@skysonginnovations.com