Synthesis and Characterization of New Terpolymers

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Summary

Vanderbilt researchers have developed a novel method for synthesizing a new class of terpolymers with tunable mechanical and chemical properties for coronary stent applications.

Addressed Need

Vascular stents can reduce mortality resulting from constricted blood flow. Previous stents, including metal stents, polymer stents, and drug-eluting stents each have drawbacks that prevent universal adoption.

There is a clinical need for improved stent material whose properties include sufficient material strength, moderate degradation kinetics, resorbable byproducts, and regulation of cell activities. Copolymers are good candidates for stent materials because copolymerziation allows for the development of materials with tunable hydrophilicity, hydrophobicity, biodegradability, and crystallinity.

Technology Description

This novel process creates a new class of copolymers with tunable mechanical and chemical properties for coronary stent applications. The products are terpolymers containing carboxylated poly(ε-caprolactone) (CPCL) in a polymer backbone of hydrophobic poly(ε-caprolactone) (PCL) and hydrophilic poly(ethylene glycol) (PEG).

The three subunits give rise to a variety of distinct material and chemical properties. PCL is a slow degrading, biocompatible polymer, PEG is a hydrophilic polyether that influences surface chemistry of proteins and cells, and CPCL is the polymer that helps bind them together and improve chemical properties.

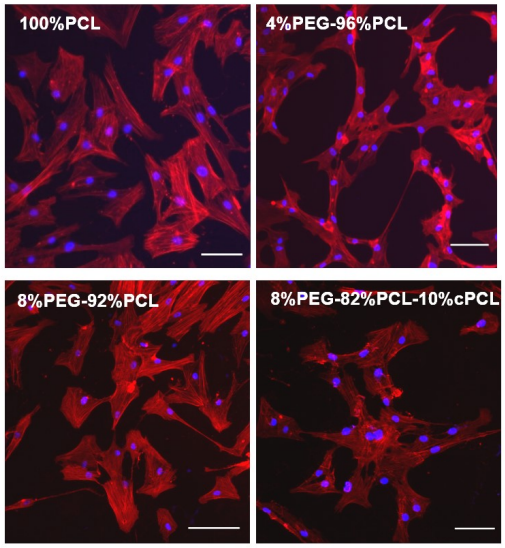

Figure 1: Response of coronary artery cells varies based on polymer composition

Technology Features

- Tunable mechanical and chemical properties allow for use in various vascular stent applications
- Cellular response varies based on polymer composition
- Use of CPCL allows for attachment of other bioactive molecules and creates a negative charge, which may prove useful for future applications.

Intellectual Property Status

- US Patent 9,012,596 has been issued.
- Visit http://research.vuse.vanderbilt.edu/biomaterials/sung/ to learn more about ongoing research programs.

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VU REFERENCE: VU 1141

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