Bioresorbable lactone-based elastomers that can be used in continuous digital light processing 3D printing applications

Unmet Need

The global market for 3D printing, or additive manufacturing, is growing rapidly with a compound annual growth rate of approximately 21% predicted to occur until 2027. Medical and dental products account for the largest market for 3D-printing materials, estimated at $637.5 million dollars globally in 2022. Continuous digital light processing (cDLP) has emerged as a popular 3D printing method due to its much faster build time compared to other additive manufacturing methods. However, the cDLP-compatible materials demonstrated thus far that are applicable for biomedical applications have suffered from limited tuning of the mechanical properties, low control of the molecular mass, or possible toxic metal contamination introduced by the catalyst. There is a need for degradable materials that can be quickly 3D printed and are useful for biomedical applications.

Technology

Duke inventors have developed a copolymer that can be used in continuous digital light processing 3D printing. This material is intended for printing degradable scaffolds for biomedical applications. Specifically, this is a poly(propylene) fumarate (PPF)-derivative ABA type triblock copolymer with a flexible lactone block core unit synthesized through ring-opening copolymerization using a $Mg(BHT)_2(THF)_2$ catalyst. 3D printing is achieved with the copolymer using thiol-ene chemistry, and the resulting material is fully degraded in hydrolytic conditions. The inventors have successfully 3D printed this material and demonstrated that it is tunable and degradable with *in*

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Meet the Inventors

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Chemistry

Publication(s)

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External Link(s)

• From the lab of Dr. Matthew Becker

vitro studies.

Advantages

- An easily synthesized material that is compatible with cDLP 3D-printing
- Uses well-known degradable polyesters that are already widely used in biomedical applications
- Properties can be tuned with monomer composition and resin formulation
- Avoids use of toxic chromium-based catalysts like related technologies