Stimulus-responsive Polymers

Tech ID: 25683 / UC Case 2015-202-0

BACKGROUND

Synthetic polymer constructs are an important tool in modern medical practice, but the lack of control over their activity limits their utility. The ability to combine structural function with localized interaction has proven extremely successful in stents, but polymer technology has not advanced sufficiently to serve a wider range of needs.

PLGA polyesters can be degraded by hydrolysis facilitating their widespread use in medicine and biomedical research. Their dependence on slow hydrolysis makes for long degradation times (half-life of one year in vivo) limiting their applicability. While degradation can be sped up by copolymerization with more hydrophilic monomers; degradation is still too slow for triggered release or degradation.

TECHNOLOGY DESCRIPTION

This technology encompasses a range of polymers engineered to degrade, or release drug cargo, upon delivery of stimulus. This allows controlled, rapid functional changes, such as the release of a medicament to a specific location. Under development are a series of polymers incorporating chemical features that allow a chemical change upon delivery of a stimulus, such as light. Through this discovery, triggered degradation is now added to the array of properties found in the growing field of functional hydrolytically-degradable PLGA-type polymers.

This work has implications in on-demand and controlled drug delivery where the favorable properties of hydrophobic polyesters (processibility and fabrication into particles, fibers, implants, etc.) can be combined with the favorable properties of hydrophilic polyesters (good biodegradation). Moreover, as the versatile design of this system allows easy replacement of the triggering group, the presented strategy may have a broad impact across a range of polymer uses.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,370,488	08/06/2019	2015-202
Patent Cooperation Treaty	Published Application	2016164828	10/13/2016	2015-202

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OTHER INFORMATION

KEYWORDS

Medical device, polymer, drug delivery, stimulus, responsive, triggered-release.

CATEGORIZED AS

- **Materials & Chemicals**
  - Biological
- **Medical**
  - Other
  - Research Tools
- **Research Tools**
  - Reagents

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