Monomers and Polymers for Functional Polycarbonates, Poly (Ester-Carbonates) and PEG-Polycarbonate Hydrogels

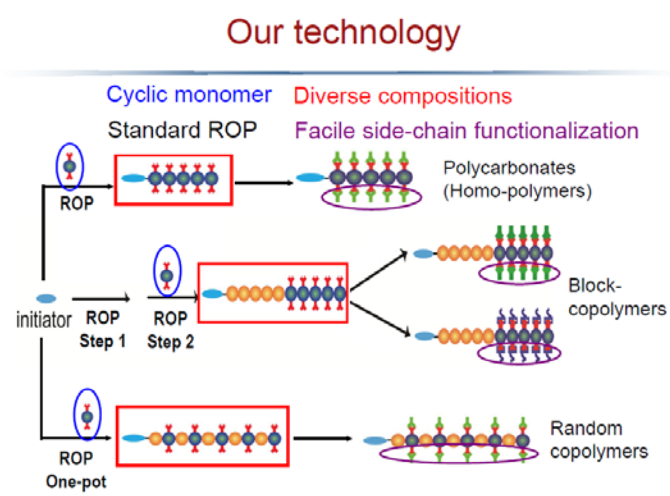
Patents Issued 3; Patent Pending 2

Background

Majority of the synthetic biodegradable polymers are hydrophobic and have acidic/inflammatory degradation products. Polycarbonates are unique in that they degrade into non-acidic degradation product and have desired mechanical properties. They are widely used as construction materials, automobile parts, eye glasses, electronic devices, labware, and medical devices. Major challenges for their biomedical applications are safety concerns over their aromatic building blocks (e.g. fertility problem linked to Bisphenol A, common building block of aromatic polycarbonates), lack of hydrophilicity and chemical functionalizability.

Technology

Researchers at UMass have synthesized novel aliphatic polycarbonates and poly(ester-carbonates). These polymers have tunable hydrophilicity and biofunctionalizability. They can be prepared using standard ring-opening polymerization (ROP) from a cyclic monomer designed to enable versatile functionalization.



Application

Drug delivery systems, Stent coating, Orthopedic implant, Bone and dental grafts, Soft tissue grafts (cartilage, ligament)

Market Potential

The global market for medical plastics reached nearly 16.8 billion USD in 2016. This market is estimated to reach 24.1 billion USD in 2022 from 17.9 billion USD in 2017 at a compound annual growth rate (CAGR) of 6.2% for 2017-2022. (bcc Research, Medical Plastics: Global Markets to 2022).

Salient Features & Competitive Edge

	Hydrophilicity	Side-chain functionality
Commercial polycarbonates & polyesters	✗	✗
UMMS polycarbonates & poly(ester-carbonates)	✓	✓

Well-defined cytocomatible polymers:

Narrow polydispersity (PDI<1.1);

Non-cytotoxic

No acidic degradation products of the polymers

Diverse polymer architectures and compositions:

Linear, branched, star-shaped, or 3D crosslinked;

Random, block or multi-segment compositions

Translational advantages:

Compatible with industrial polymerization technique;

Cyclic functional monomer enabling diverse chemical modifications

Facile post-polymerization functionalizations:

High-efficiency modification at room temp, in aqueous media, and at physiological pH

Business Opportunity

UMass OTM is seeking interest from parties for licensing and/or sponsoring collaborative research to develop, evaluate, or commercialize this technology.

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