



Synthesis of Biodegradable Graft Copolymers

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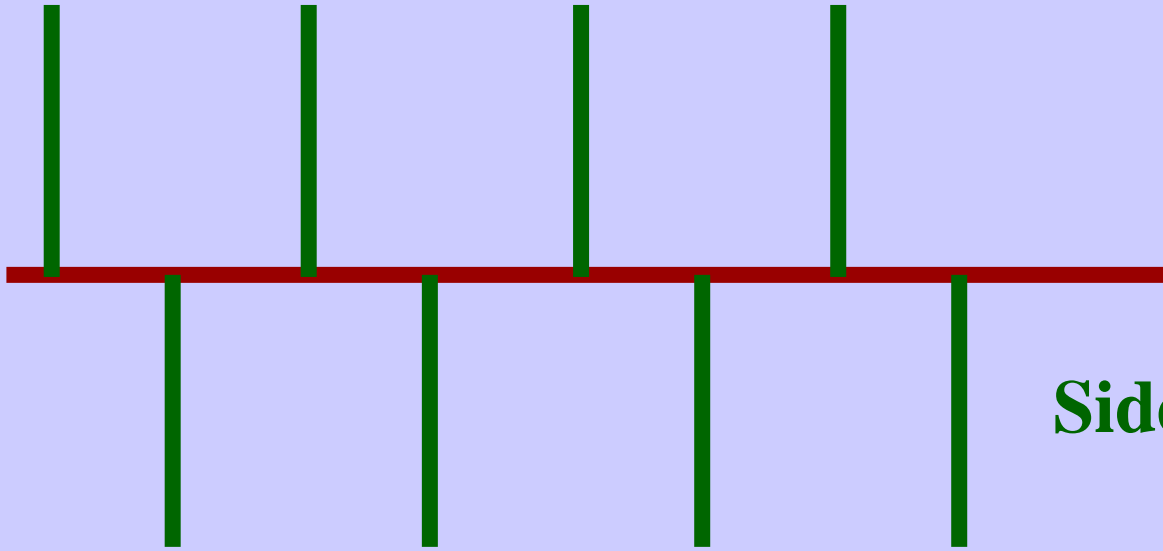
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Control

Backbone:

- Length
- Hydrophilicity
- Biodegradability
- Bioresorbability



Side Chain:

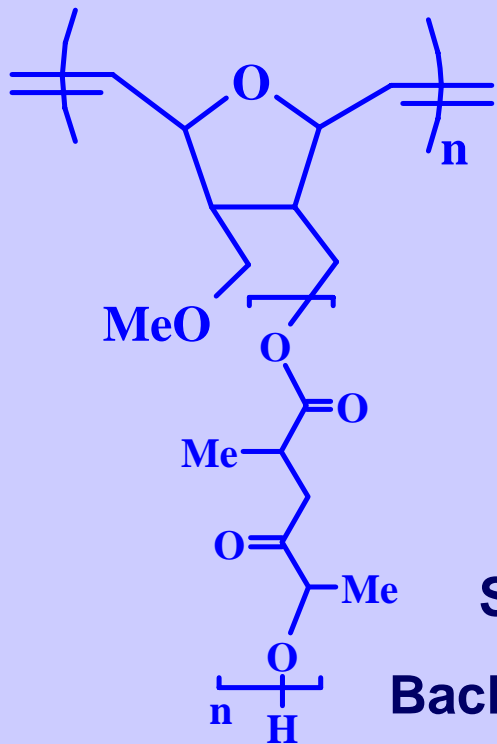
- Length
- Density
- Distribution
- Biodegradability
- Bioresorbability

Why?

- Biodegradable/Bioresorbable
- Side chains degrade first
- Breakdown of the Backbone
- Controlled loss of mechanical properties

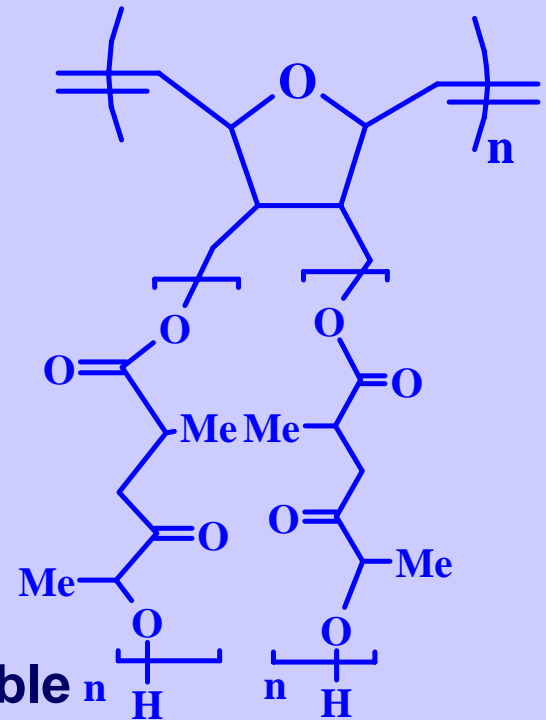
Combination of ROP and ROMP

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Side chain: PLA, Rigid

Backbone: Poly(OxaNBE), Flexible



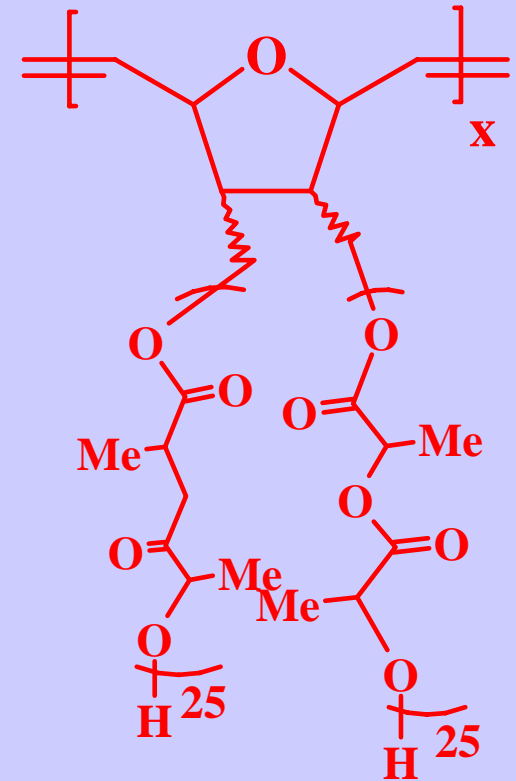
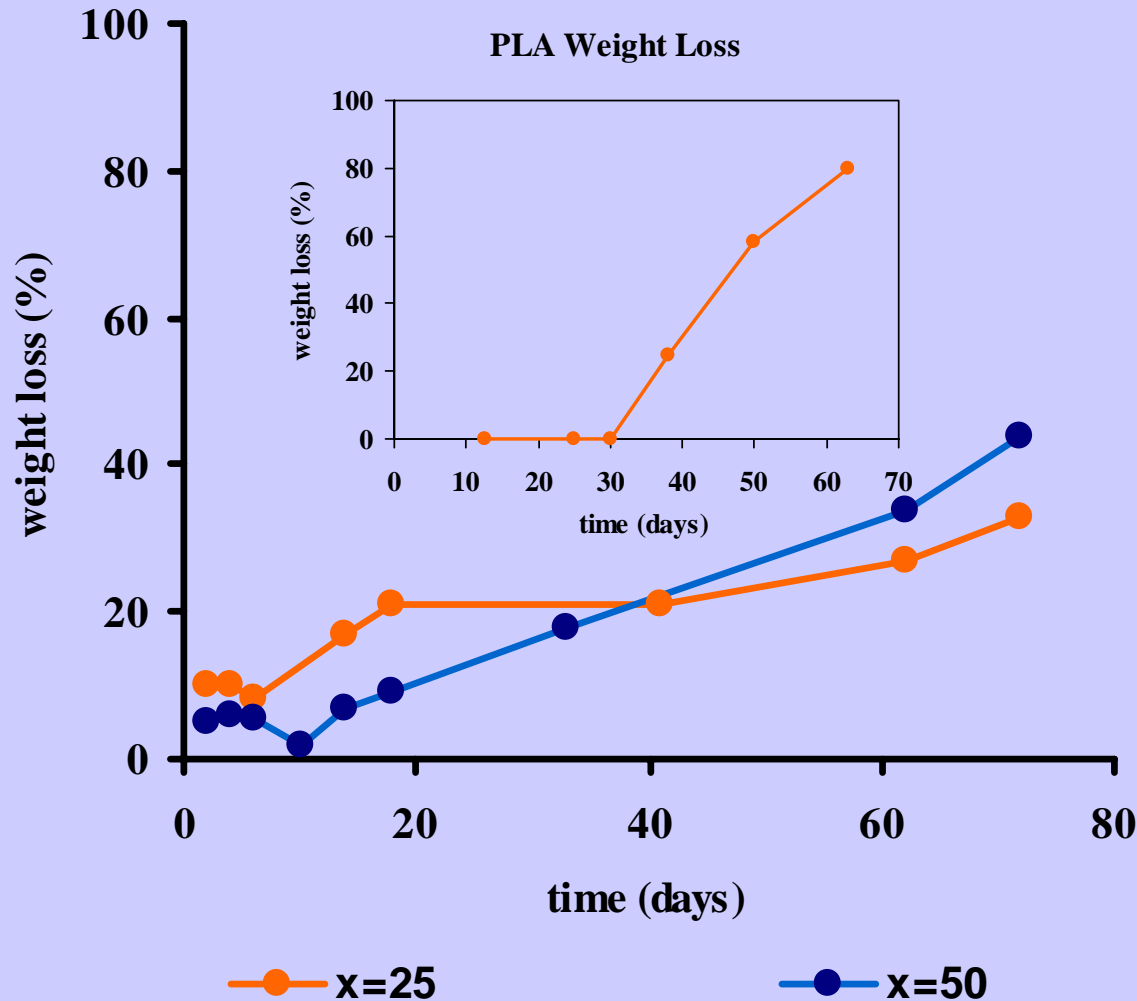
Oxygen in the ring makes the backbone hydrophilic and hence increases the biocompatibility of the backbone

PLA degrades first and the mechanical properties change gradually from a rigid to flexible material.

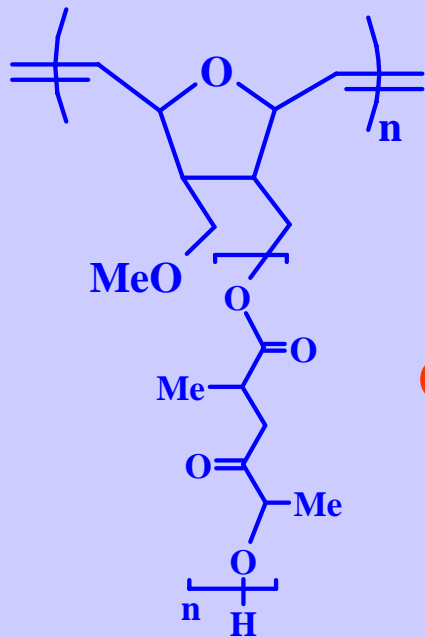
In this way increasing load is introduced gradually onto the supported bone or tissue, which will aid the healing process.

Comparison with PLA Materials

Relative Weight Loss of exo,exo-Graft Copolymers

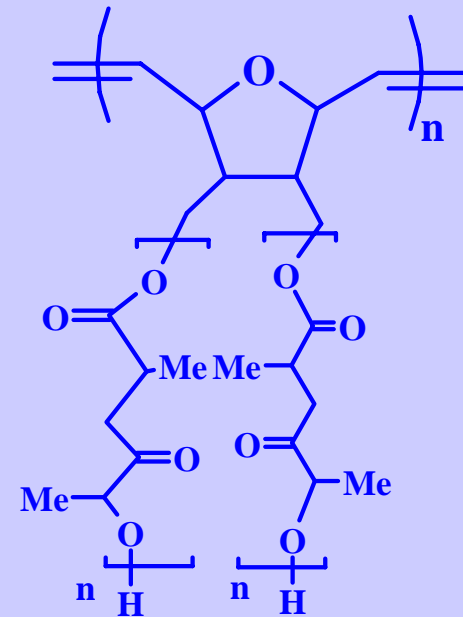


Polymer film, pH = 7.4, at 37°C



Conclusions

Control all aspects



The length of PLA side chains: important in degradation behaviour.

Two PLA side chains on each oxacyclopentane ring exhibit the slowest rate of degradation: steric interactions.

PLA homopolymer as impurities significantly increases the rate of degradation.

PLA show 80% weight loss in 80 days whereas our materials show 40% over the same period of time.

PLA side chains are biodegradable but the biostability of the backbone chain is unknown: a function of DP.