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A strategy to tailor the mechanical and degradation properties of PCL-PEG-PCL based copolymers for biomedical application

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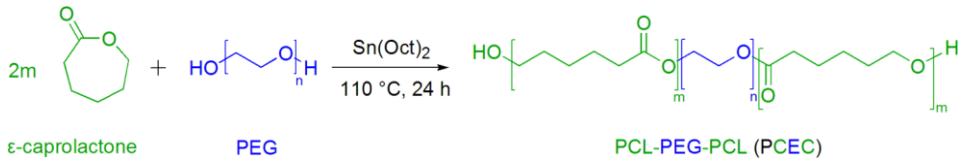
Introduction

Biodegradable, biocompatible and 3D printable biomaterials with ***tunable mechanical properties and degradation rates*** adapted to target tissues were urgently required to ***manufacture scaffolds*** for tissue regeneration.

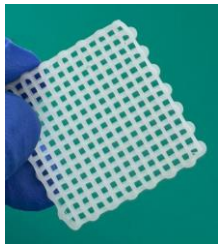
Materials and Methods



Synthesis: ring-opening reaction of Ɛ-CL and PEG with different molecular weights

(PEG Mn = 0.6 k, 2 k, 6 k, 20 k and 35 k g/mol)

Conclusion



- ✓ ***Three different crystallization regimes***
- ✓ ***Tunable mechanical and degradation properties***
- ✓ ***3D-printed scaffolds with controlled structure***

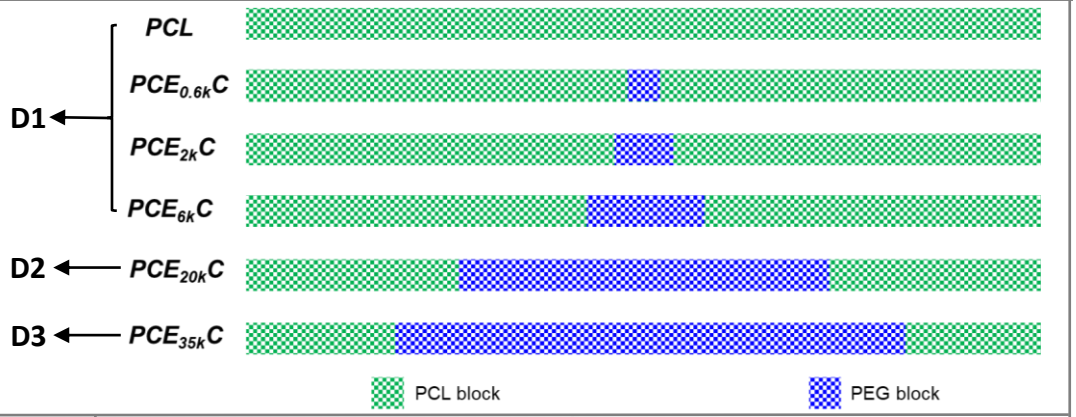
Results and Discussion

➢ ***Structure designs***

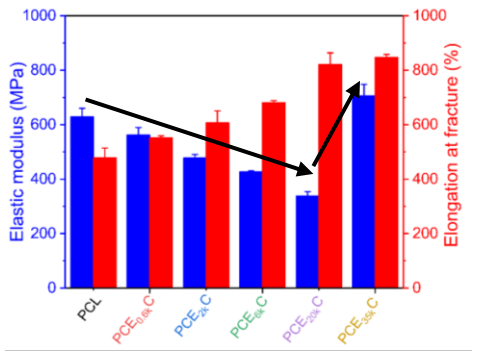
D1. PCL block > PEG block

D2. PCL block = PEG block

D3. PCL block < PEG block

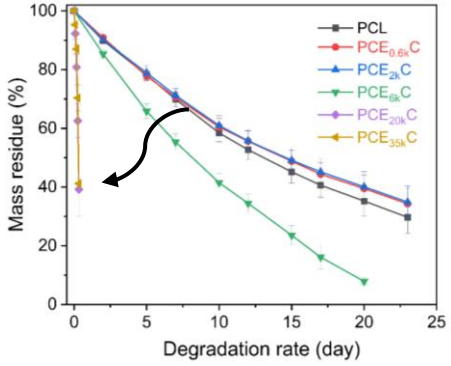


➢ ***Tunable mechanical properties***



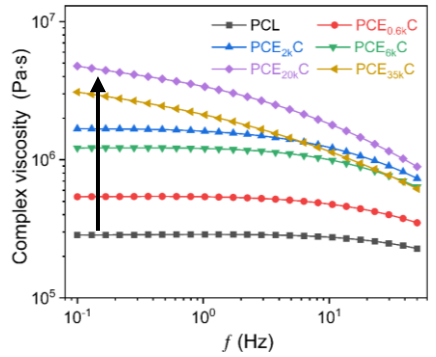
Elastic modulus: 338–705 MPa

➢ ***Tunable degradation rates***
(Accelerated degraded condition)



Faster degradation rates

➢ ***Tunable rheological behavior***



Apparent shear-thinning phenomenon