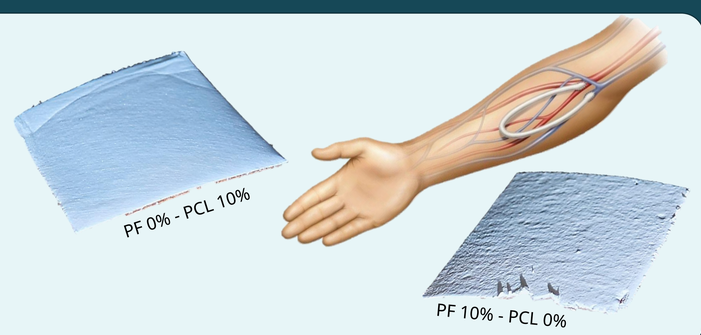
Electrospun PF-PCL Scaffolds to enhance hydrophilicity and mechanical performance for AV-graft applications

Inmaculada de Dios Pérez [1, 2, 3], Amy Morgan [4], Ben Cassidy [1, 2], Ilida Ortega [4] and Patricia P. Esteban [1, 2]

[1] Healthcare Technologies Institute, University of Birmingham, UK; [2] Department of Chemical Engineering, University of Birmingham, UK;
[3] Department of Chemical Engineering, University of Salamanca, Spain; [4] School of Clinical Dentistry, The University of Sheffield, UK

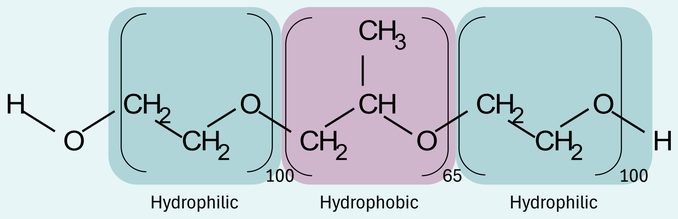
Introduction and objective

Arteriovenous (AV) grafts for hemodialysis show high failure rates (~70% in the first year), mainly due to poor wettability and limited tissue integration, leading to thrombosis, leakage, and infection.
Although decellularized extracellular matrix (dECM) hydrogels improve biocompatibility, their adhesion to AV grafts is limited by low surface wettability.
This work proposes electrospun PCL–PF scaffold coatings, combining the mechanical stability of poly(ε-caprolactone) (PCL) with the wettability enhancement provided by Pluronic® F127 (PF).

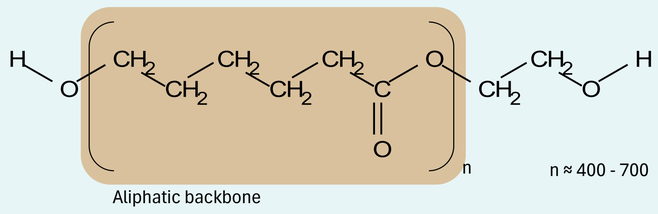


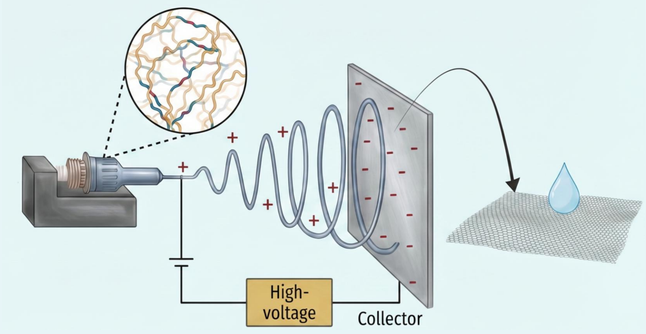
Methodology

Pluronic F-127 (PF)



Polycaprolactone (PCL)





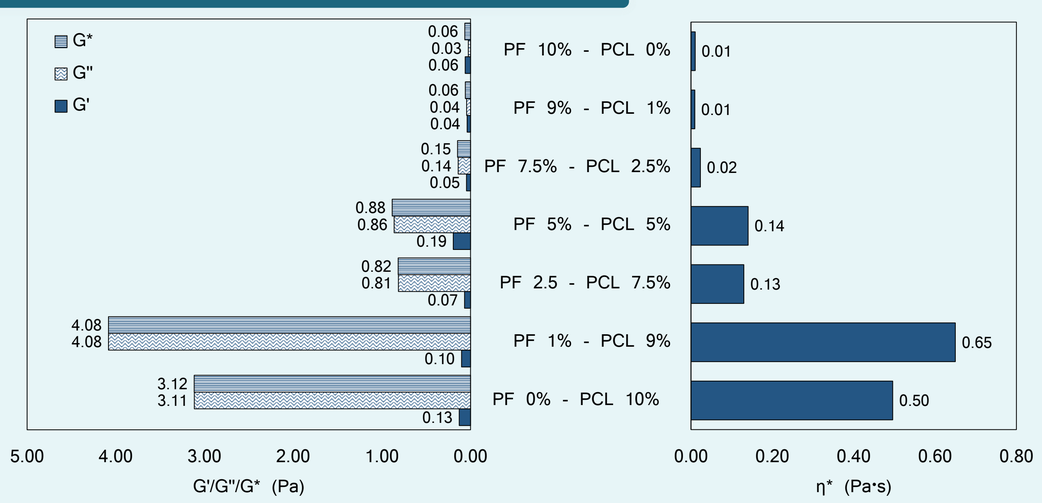
1°) Solutions preparation
PCL and PF dissolved in DCM/DMF

2°) Rheological characterization
Viscosity and suitability for fiber formation

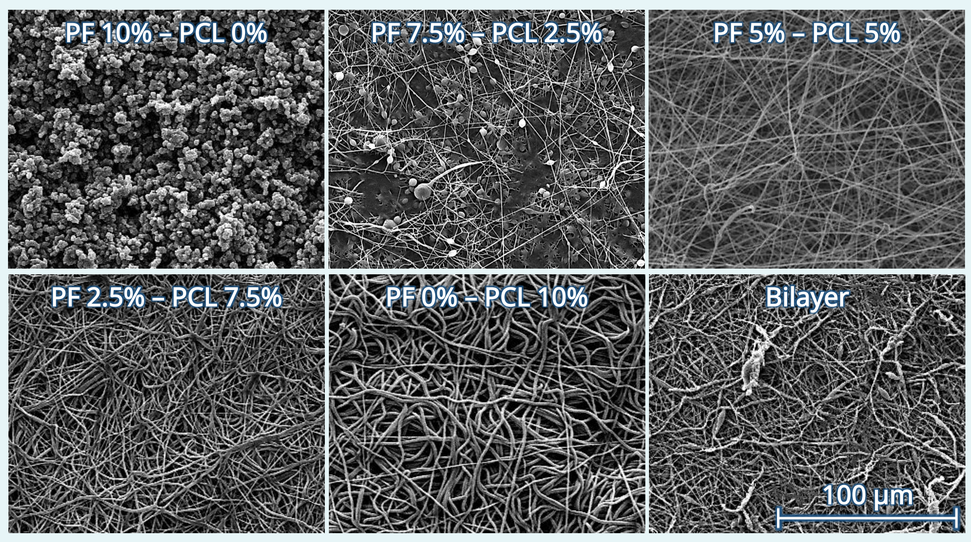
3°) Electrospinning
Fabrication of PLC-PF Scaffolds

4°) Characterization:
Fiber morphology (SEM)
Mechanical Behaviour (Tensile)
Wettanility (Contact angle)

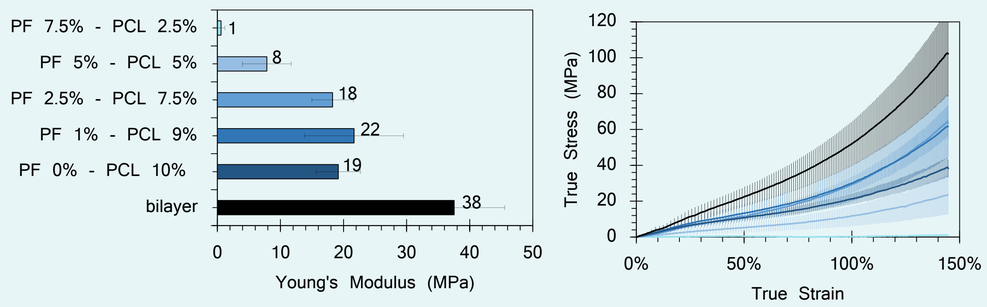
Results and discussion



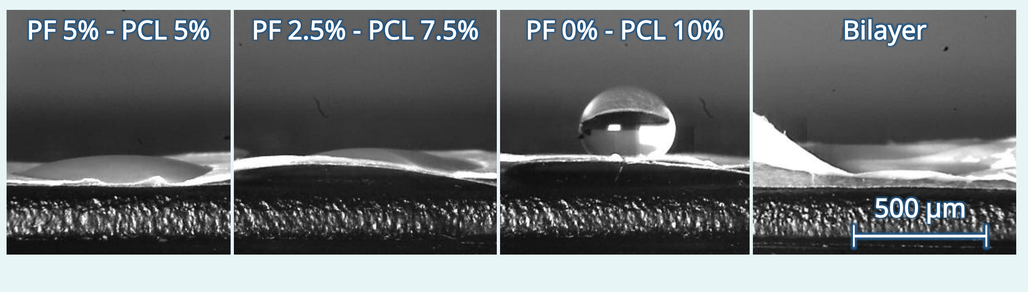
1. Viscosity and storage modulus of PCL–PF solutions as a function of polymer composition. Increasing PF content reduced solution viscosity, facilitating fiber thinning during electrospinning



2. SEM micrographs of electrospun PCL–PF scaffolds with varying compositions. PF-dominated formulations produced thinner fibers with visible micellar features, whereas PCL-rich blends resulted in thicker, more uniform fibers.



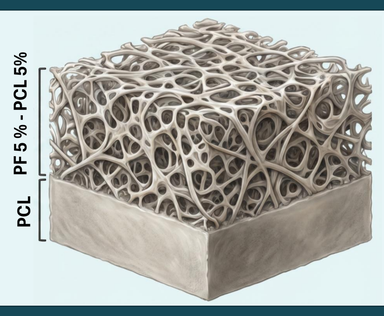
3. Young's modulus and stress–strain behavior of electrospun PF-PCL scaffolds and bilayer construct. Higher PF contents reduced stiffness, while the bilayer scaffold preserved mechanical robustness comparable to PCL.



4. Static water contact-angle comparison across PCL–PF compositions and bilayer scaffold. Surface wettability increased markedly with incorporation of PF. Pure PCL scaffolds remained hydrophobic, while even low PF contents promoted rapid droplet spreading.

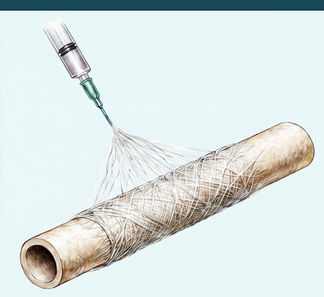
Conclusions

- PF–PCL blends tune fibre morphology and wettability
- PF increases hydrophilicity compared to pure PCL
- Bilayer scaffolds combine mechanical stability and surface wettability, showing potential for AV graft coatings



Next steps

Electrospinning on the AV graft
1°) Tensile test with grafts
2°) Addition of dECM
3°) Degradation test
4°) *In vitro* and i*n vivo* studies



Acknowledgments

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