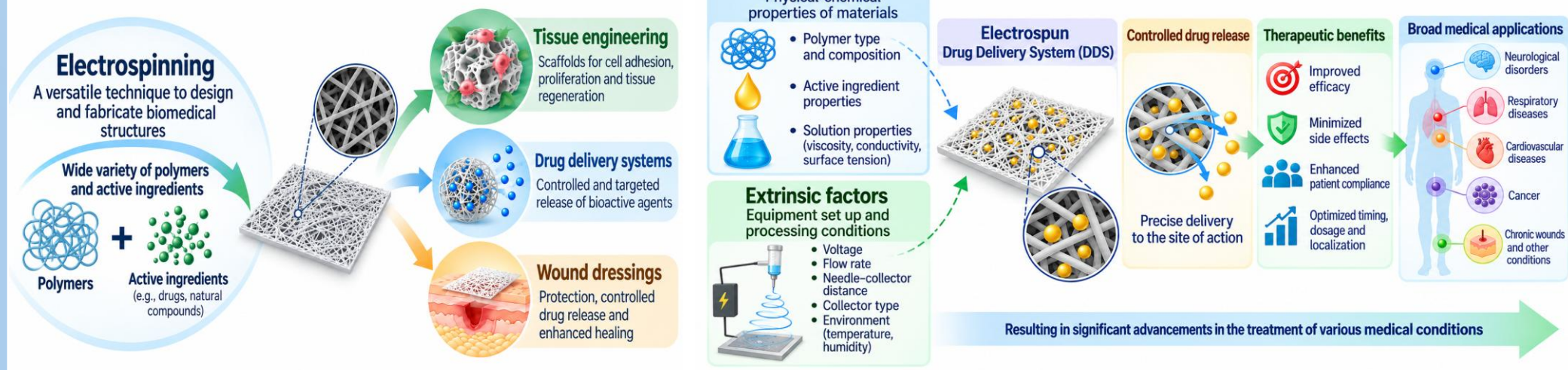
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Polyurethane/Polycaprolactone carried with Ozonized Sunflower Oil Wound Dressing for Infected Drug Delivery Systems

Dioney Neves, Karina L. Andrade, Rita C. S. Curto Valle, Cintia Marangoni e Ricardo A. F. Machado
Universidade Federal de Santa Catarina

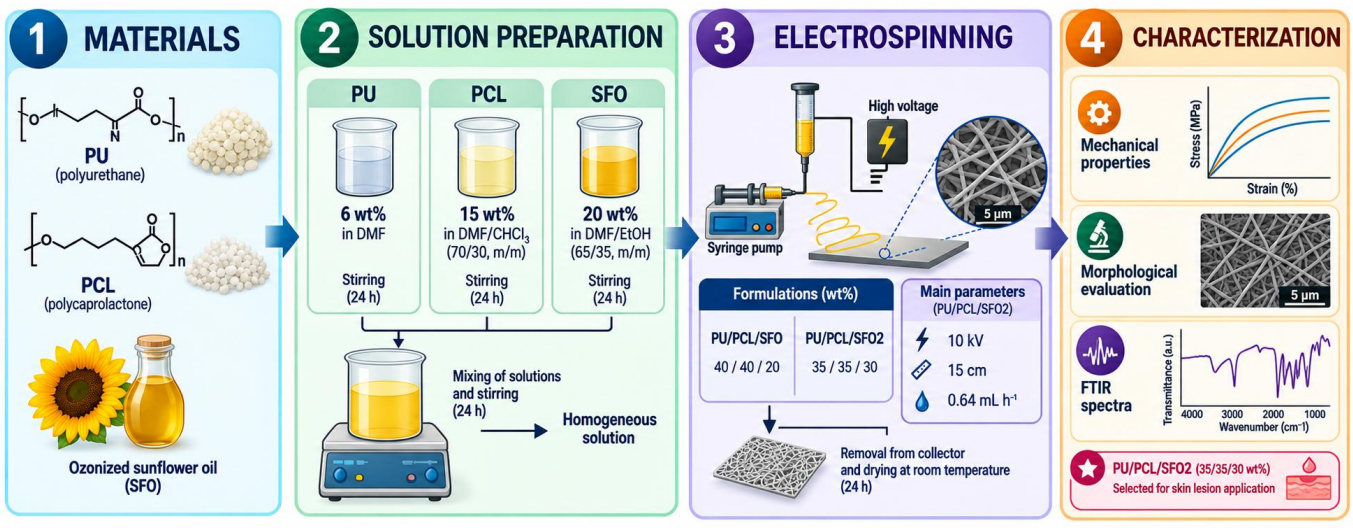
Introduction



Objective

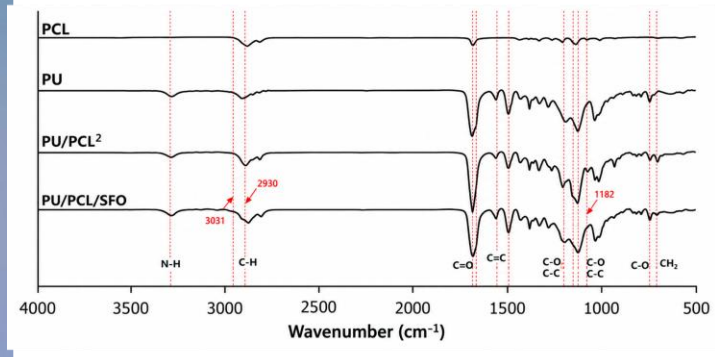
Synthesize and electrospun biodegradable PU/PCL fibers with ozonated sunflower oil to develop a biomedical scaffold for skin regeneration, combining moisture retention, bacterial barrier function, oxygen permeability, and controlled drug delivery.

Methodology



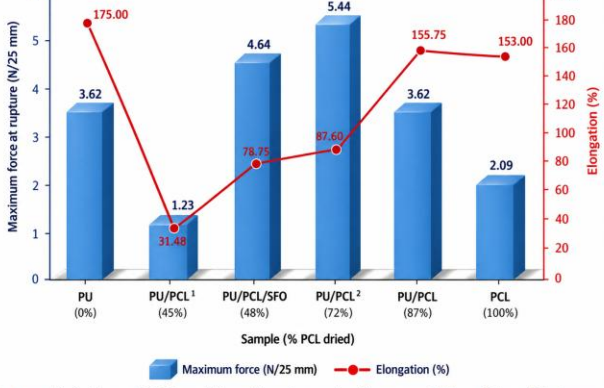
Results

Fourier Transform Infrared Spectrometer of electrospun pure PCL, pure PU, PU/PCL and PU/PCL/SFO composites



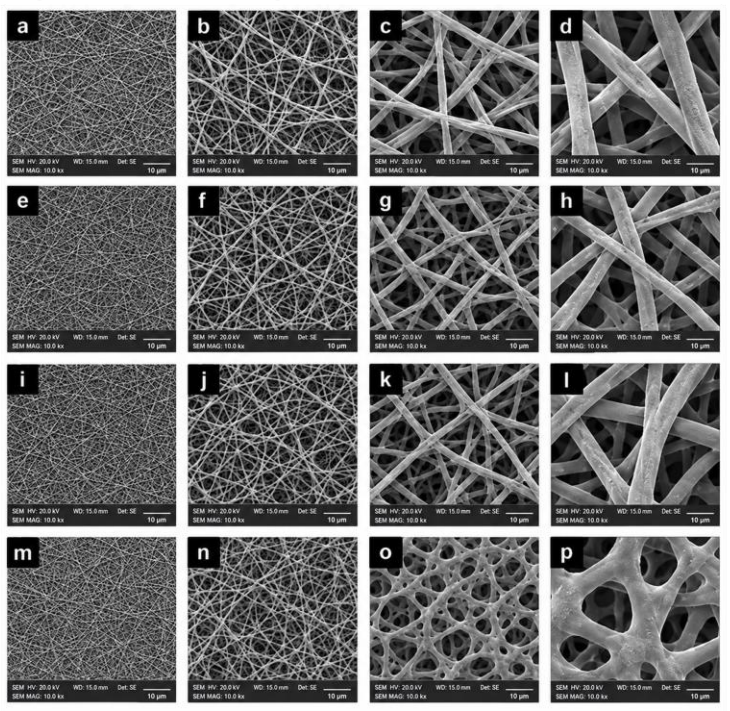
FTIR spectroscopy confirmed the chemical integrity and functional groups of PU, PCL, and SFO within the hybrid matrix, validating the effective incorporation of the active ozonated oil.

Comparison of mechanical properties of the pure PU, pure PCL and composites PU/PCL scaffolds



Adding PCL effectively reinforced the Bio-PU matrix, improving tensile strength while maintaining the flexibility needed for handling and applying the wound dressing.

Scanning electron microscopy (SEM) photomicrographs of the electrospun nanofibers: (a-d) PU/PCL[1], (e-h) PU/PCL[2], (i-l) PU/PCL/SFO, (m-p) PU/PCL/SFO[2]. The imagens were recorded at a magnification of 1,000X; 5,000X; 10,000X; and 20,000X.



SEM confirmed the successful formation of nanoscale, continuous, and defect-free (bead-free) fibers with smooth surfaces and interconnected crossing points. The PU/PCL/SFO (16:39:45 % w/w) formulation showed the highest potential for skin lesion applications.

Conclusions



Single-needle electrospinning proved an **efficient, reproducible** technique for fabricating hybrid nanofibrous scaffolds of bio-based polyurethane (Bio-PU) and polycaprolactone (PCL) loaded with ozonated sunflower oil (SFO).



The developed **Bio-PU/PCL/SFO hybrid nanofibrous system** shows great promise as an **advanced wound dressing** and active **Drug Delivery System (DDS)** for tissue engineering and infected wound management.

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