

# Scaffold Fabrication in Tissue Engineering

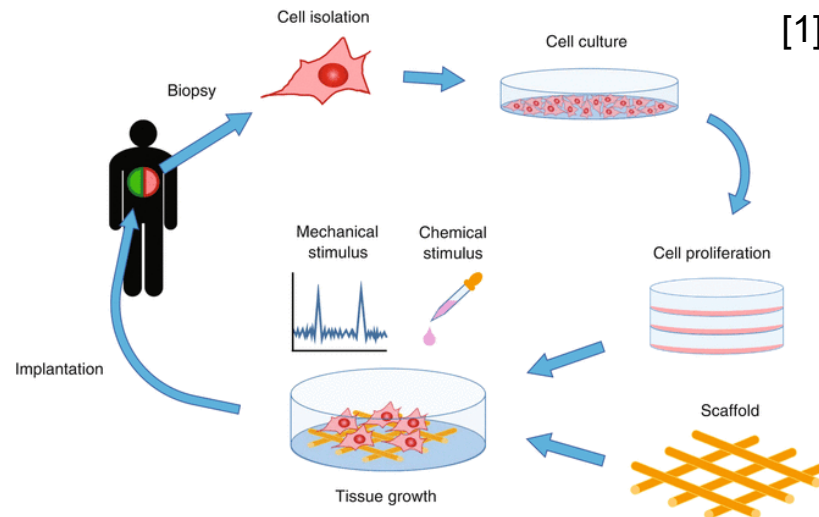


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# Tissue Engineering

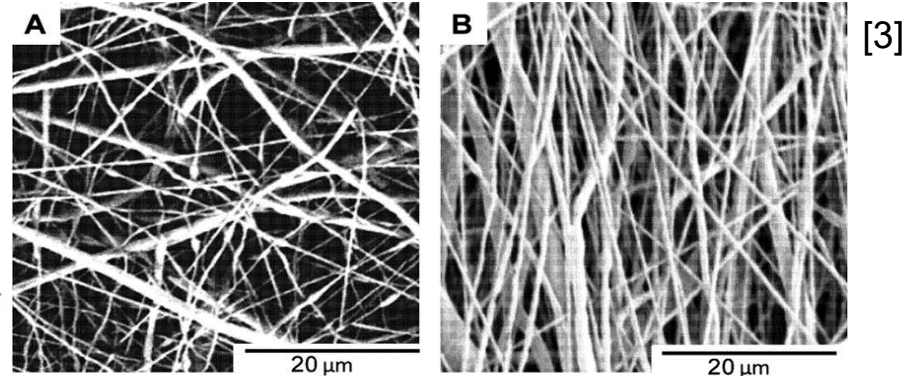
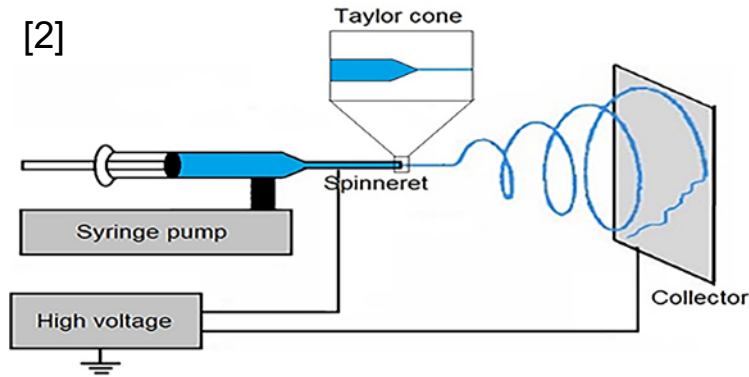
- A multidisciplinary field that seeks to repair, replace, maintain, or improve tissue and organ function
- Focuses on the interaction of cells and scaffolds
  - Scaffolds mimic the extracellular matrix
  - Cells are seeded onto scaffolds to grow and proliferate



# Scaffold Fabrication

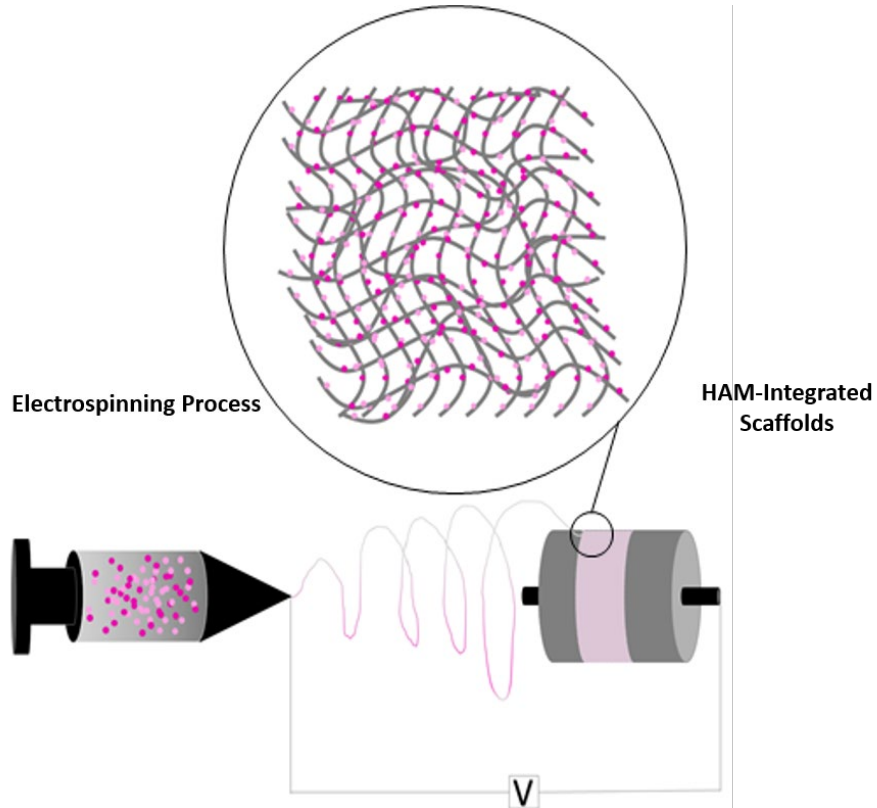
- Mimic the extracellular matrix
- Engineered to cause desirable cellular interactions, such as:
  - Cell attachment, cell migration, cell proliferation, mechanical strength, nutrient/biochemical factor diffusion
- Made from a variety of materials, both natural and synthetic
  - Natural: Collagen, Synthetic: polycaprolactone (PCL), polyethylene glycol (PEO)
- Created using a variety of techniques
  - Electrospinning
  - Freeze Drying

# Electrospinning

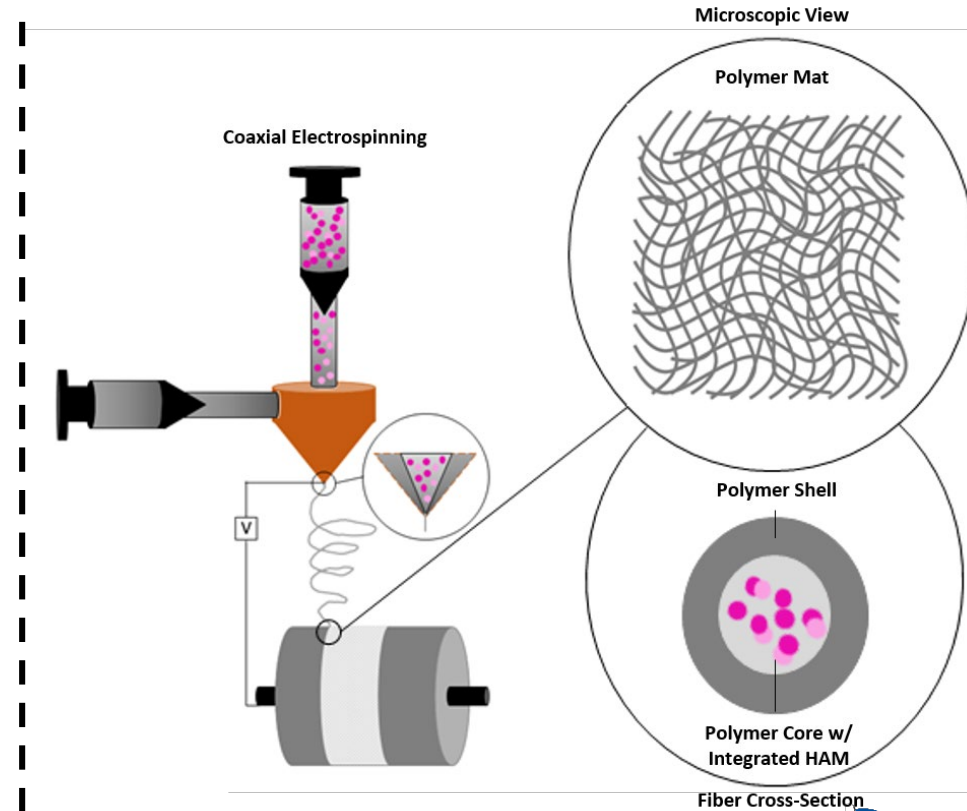


- Process parameters: solution properties, electric potential, flow rate, distance, needle gauge, collector design, ambient parameters
- Types: Blend electrospinning, coaxial electrospinning

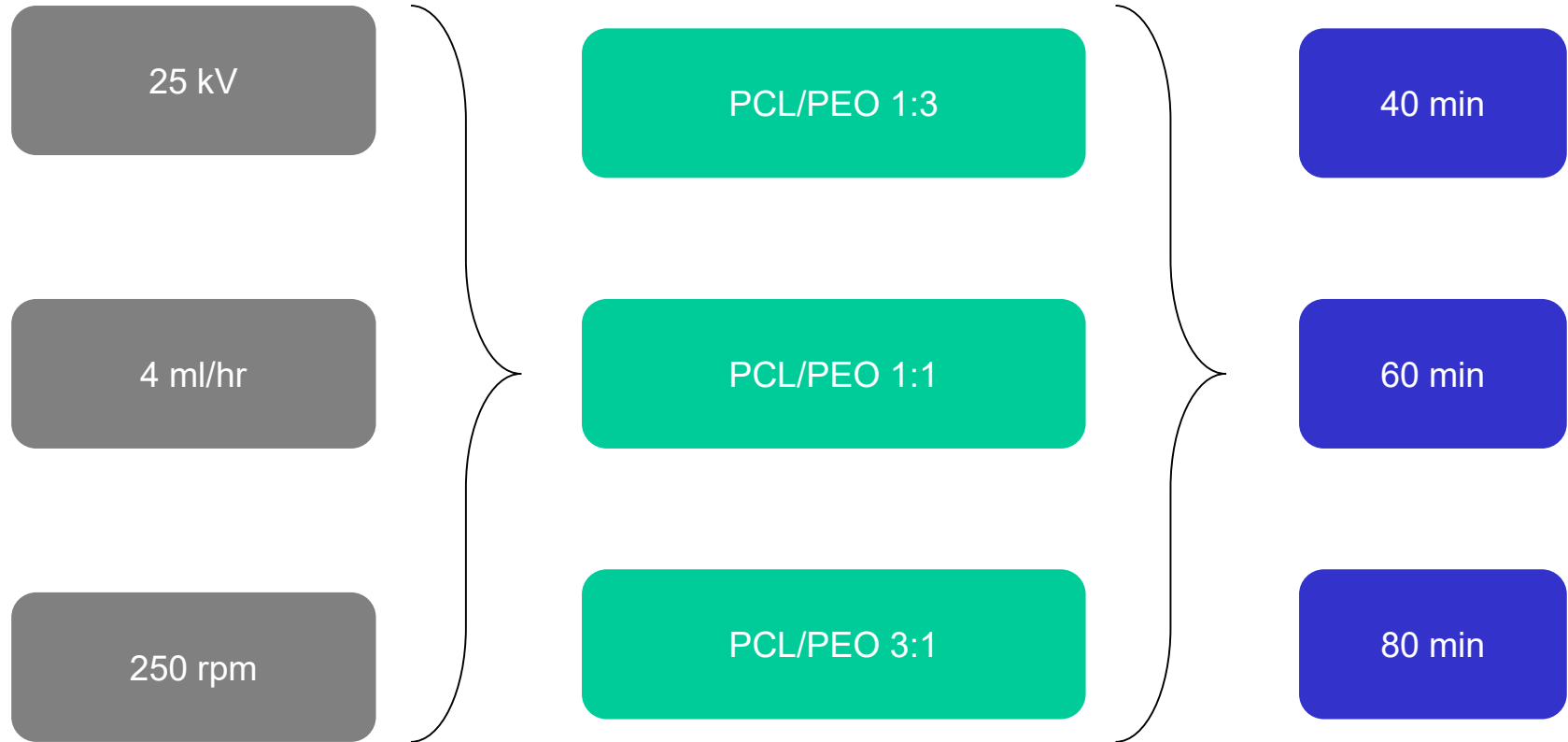
# Blend Electrospinning



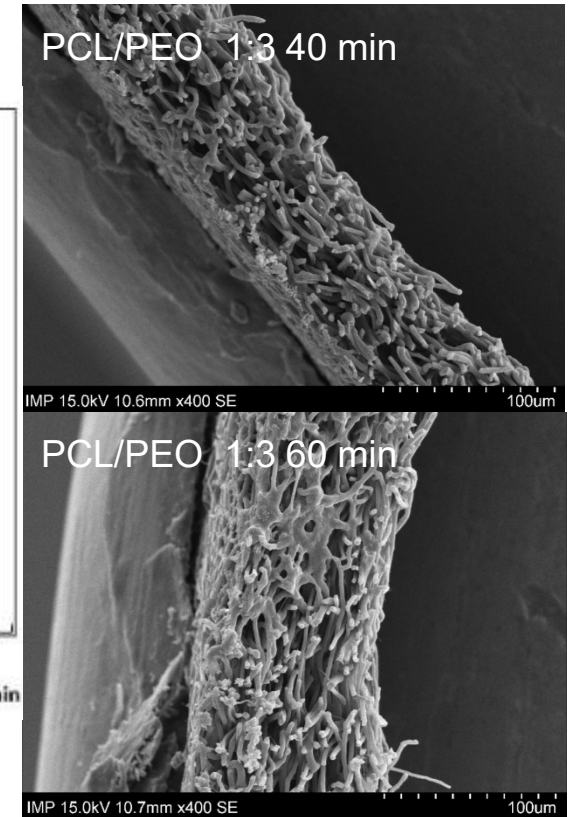
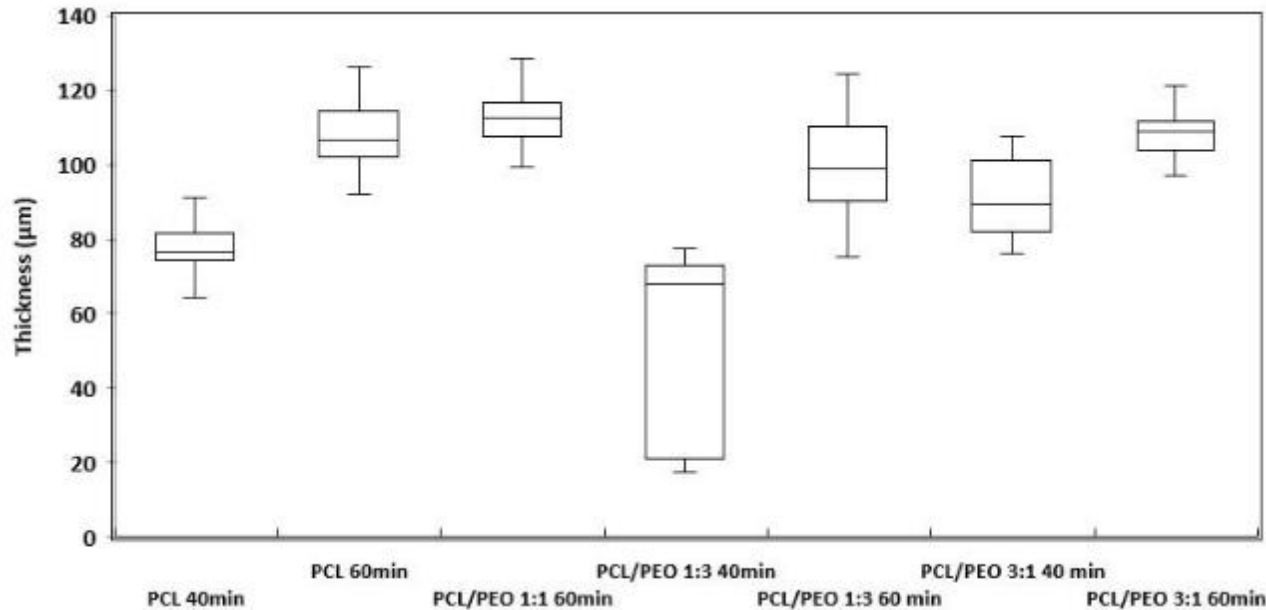
# Coaxial Electrospinning



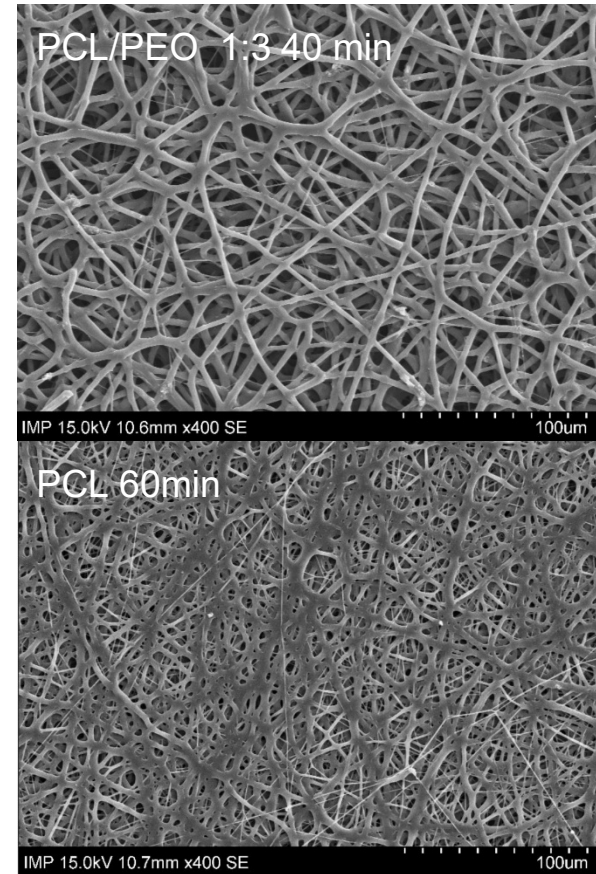
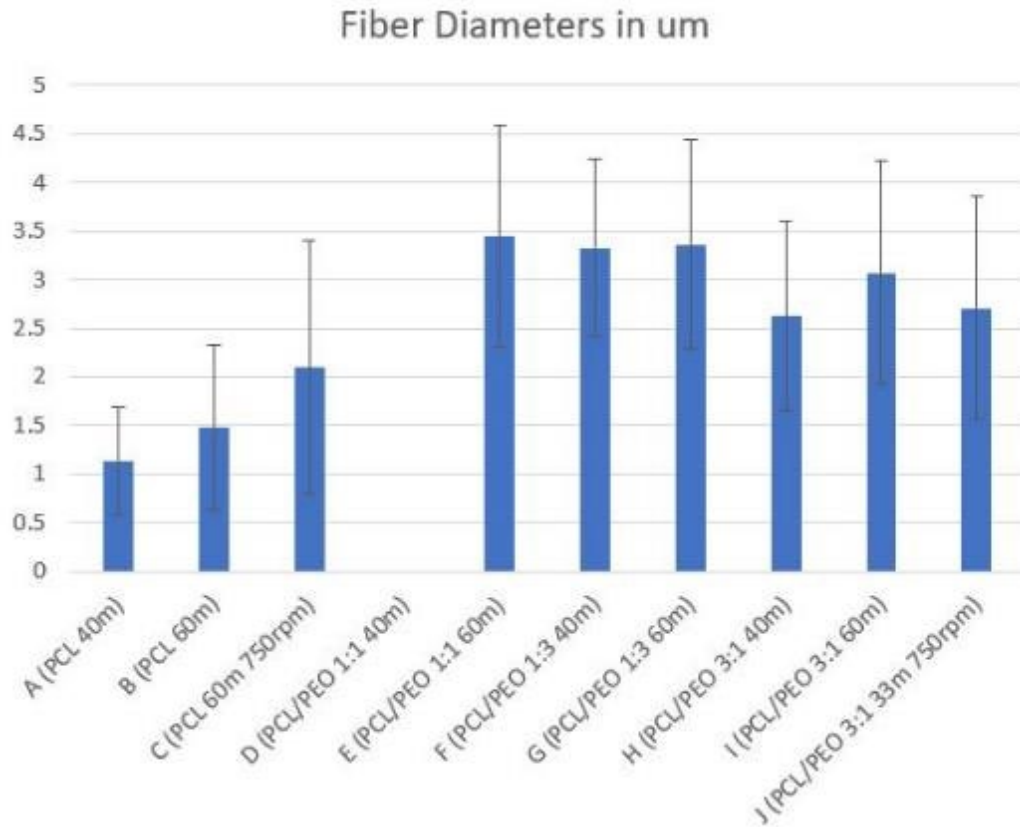
# Blend Fiber Mats



# Blend Results - Thickness

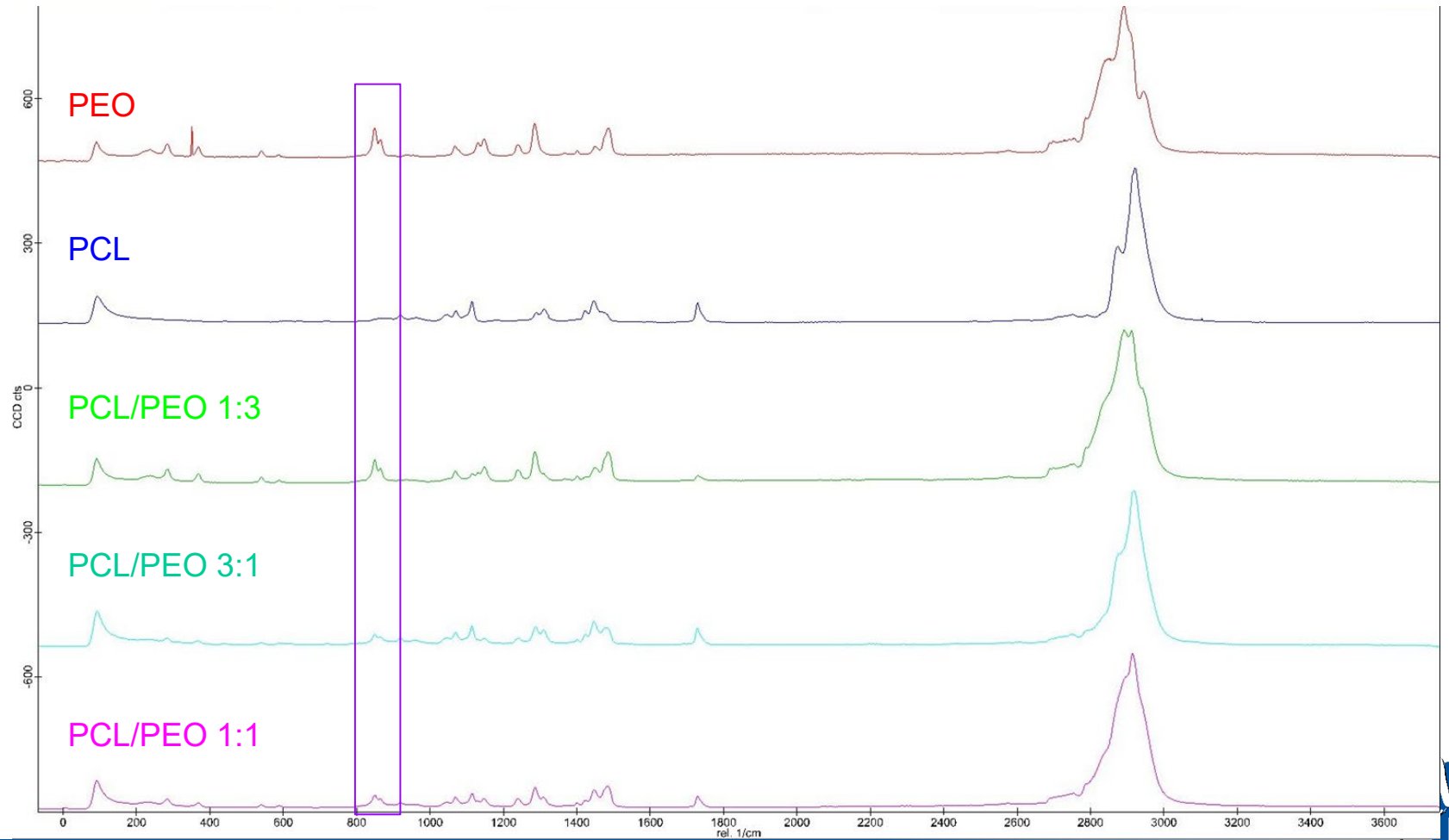


# Blend Results - Fiber Diameter

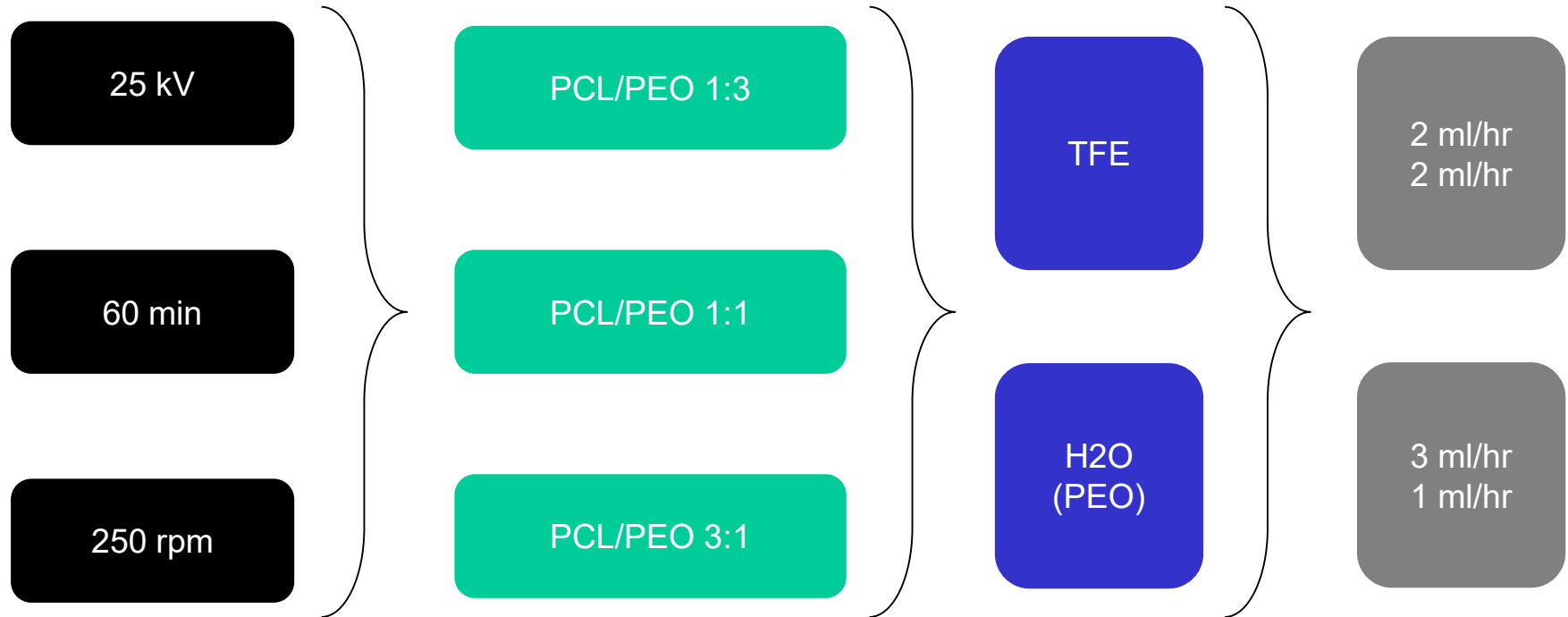




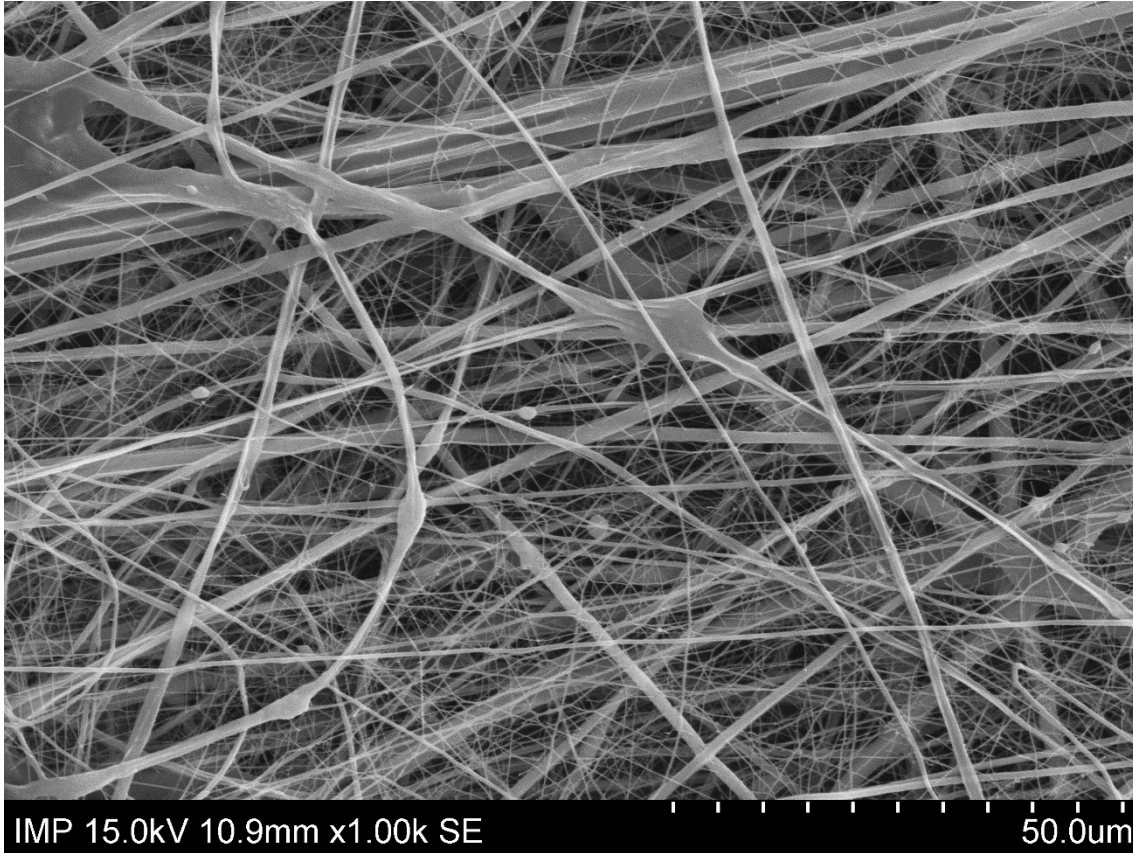
# Blend Results - RAMAN



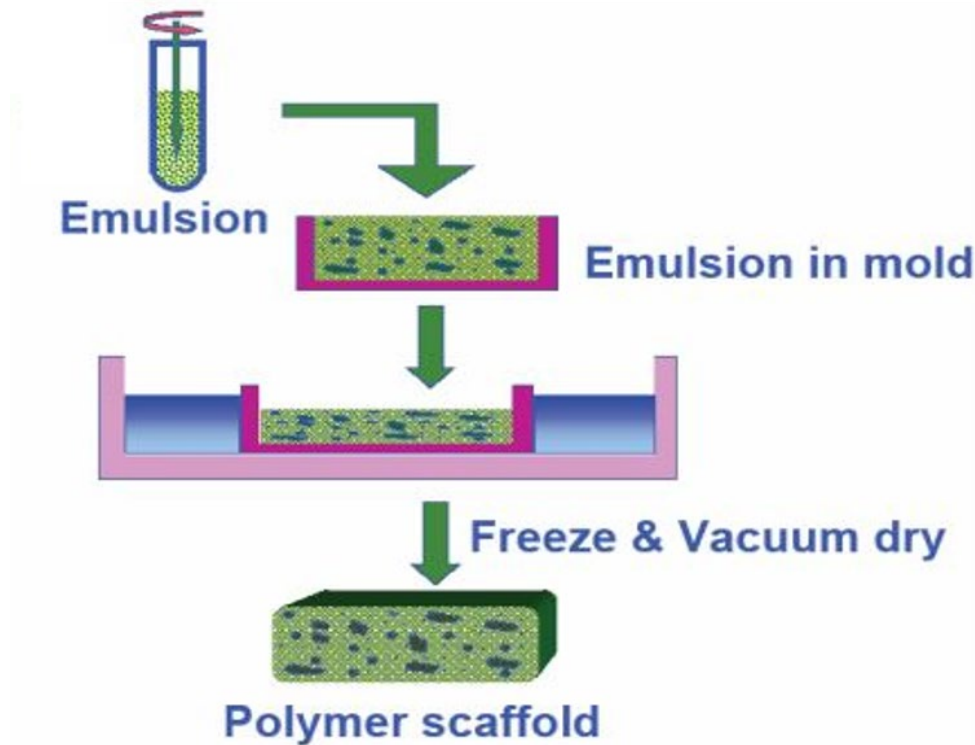
# CoAxial Fiber Mats



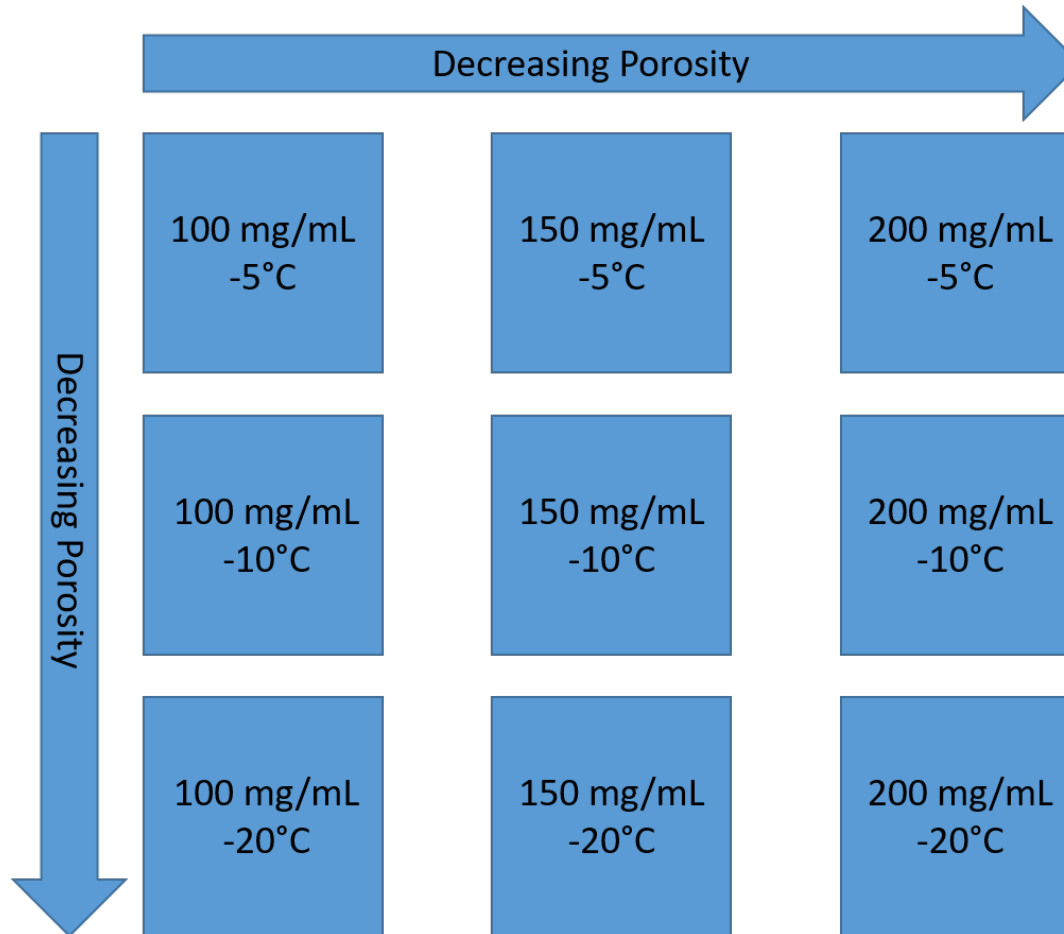
# Coaxial Results



# Freeze Dry Scaffolds

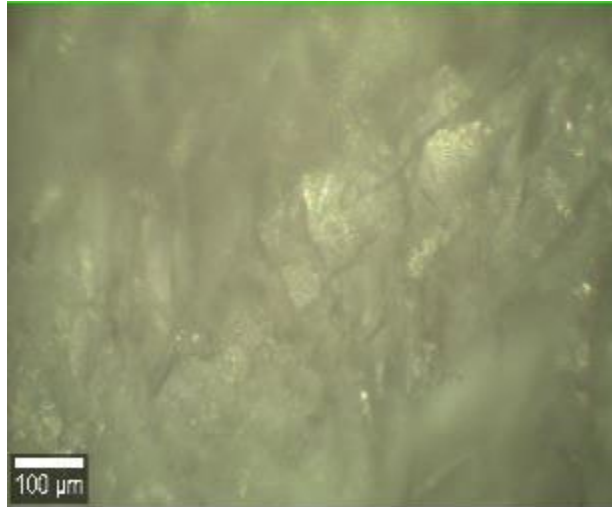


# Freeze Dry Scaffolds

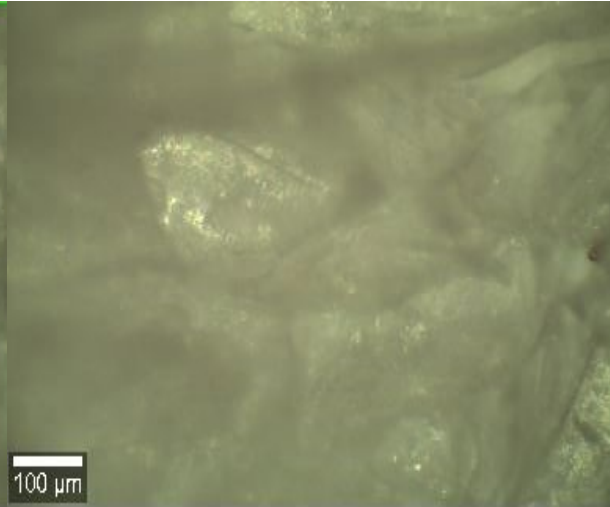


# Freeze Dry Results

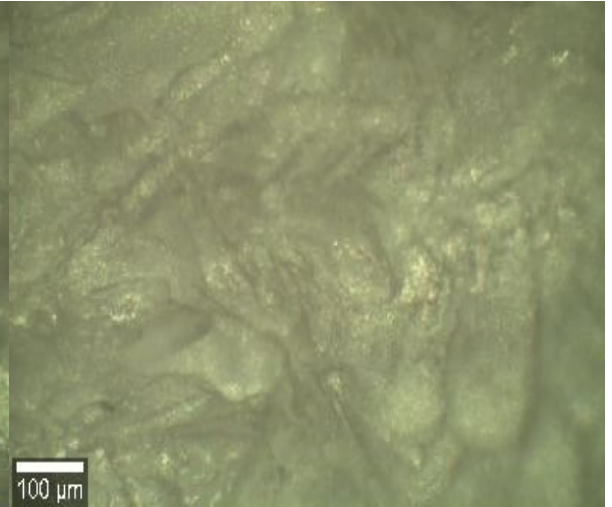
10% PCL Scaffold



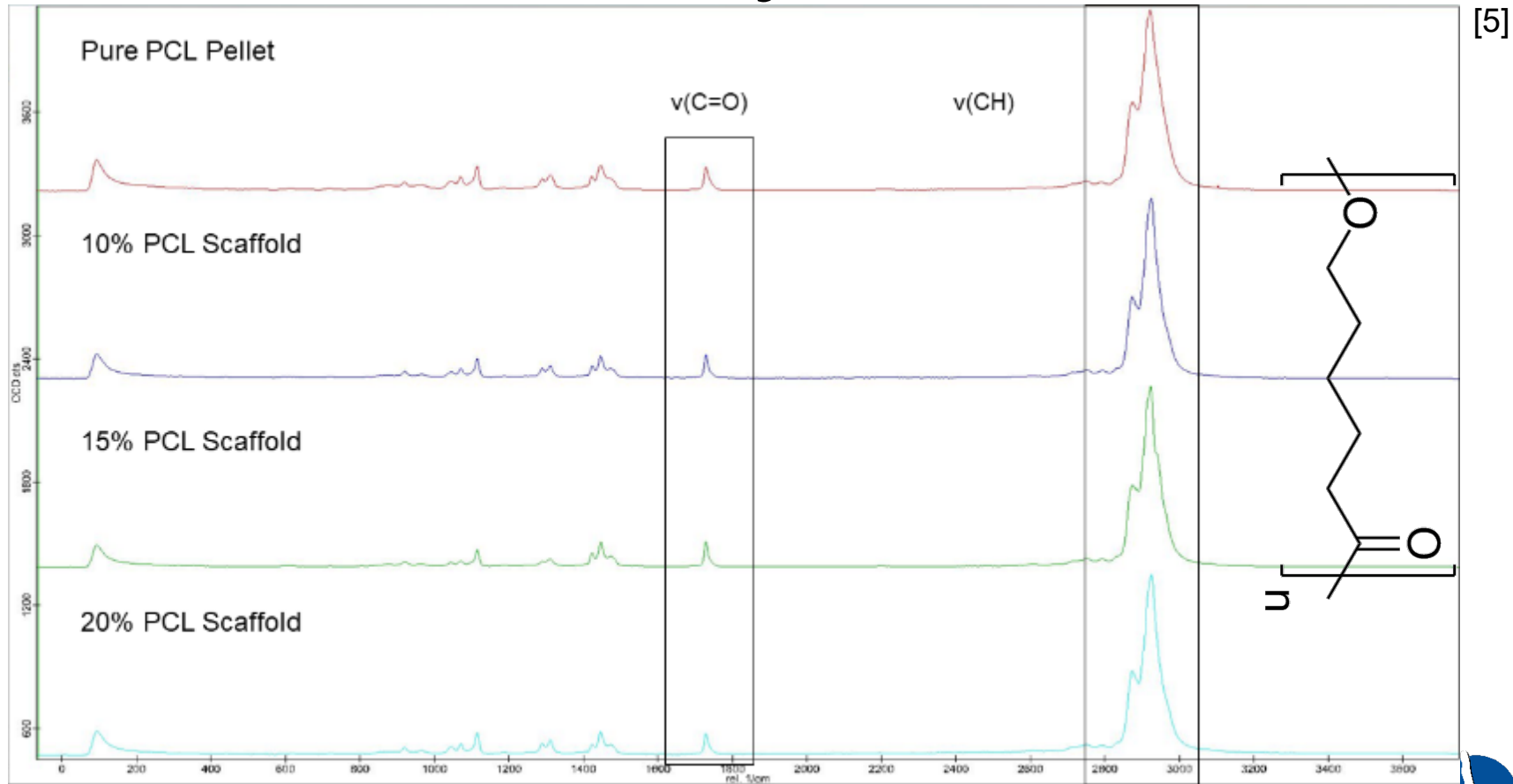
15% PCL Scaffold



20% PCL Scaffold



# Freeze Dry Results



# Freeze Dry Scaffolds

## **+Advantages:**

- +Relatively straightforward method
- +Proven with a variety of polymers<sup>6</sup>
- +High pore interconnectivity<sup>6</sup>

## **-Disadvantages:**

- Long processing time<sup>6</sup>
- Small and irregular pore size<sup>6</sup>
- More difficult manipulation



# References

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# Experience in Germany



# Differences

- Public Transportation
- Graffiti
- Green Space



# Food



# Beer



# Ice Cream



# Architecture



# Architecture





# Art



# Thanks!



# Acknowledgements

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