

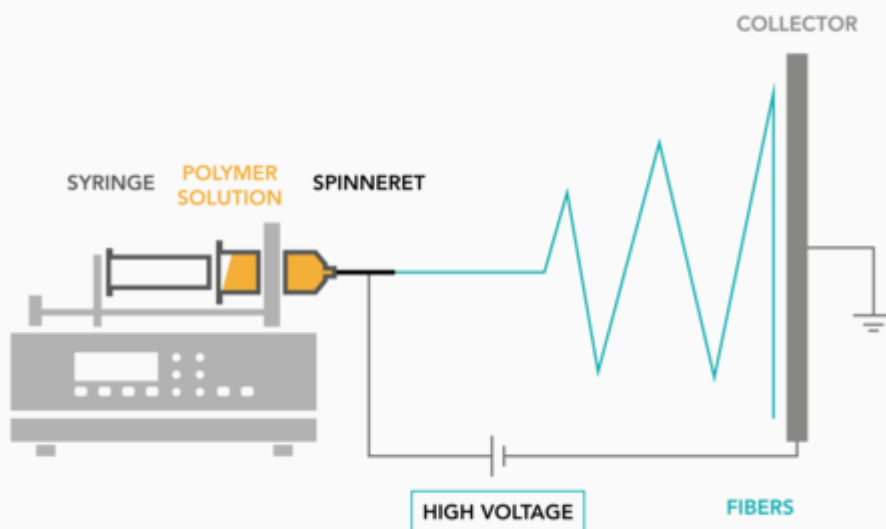
ELECTROSPINNING FOR BEGINNERS

Electrospinning is a polymer extrusion-based technology, popular for its ability to fabricate ultra-thin fibres of micrometre to nanometre in diameter.

In brief, it involves the use of polymers in solution, usually formed by its dissolution in a solvent.

The basic electrospinning setup involves

- A high voltage supplier
- A set of capillary tubes with small needles
- A grounded metallic collecting plate or drum.



Electrically charged polymer jets are ejected from a needle and are attracted towards the grounded collecting instrument of choice. During this ejection, solvents will be evaporated off, leaving the solidified strand of polymer to collect on either the plate or drum.

DO I CHOOSE PLATE OR DRUM?

Plates: Collecting plates are flat and planar, usually fixed vertically to the plane of collection. These are often used for the collection of randomly distributed mats



Figure 1: Linari stainless steel flat plate collector

Drums: Cylinder collecting drums are designed to quickly rotate and allow for the collection of aligned fibres.



Figure 2: Linari stainless steel rotating drum collector and digitally controlled rotation system

WHAT MATERIAL TO USE?

Polymers and solvent systems are dependent on what the electrospun construct is to be used for. There are many different polymers that have been successfully used, including natural (Collagen, gelatin, alginate) and synthetic (PCL, polyurethanes).

Solvent is also an important choice. Volatile solvents such as chloroform or DMSO are often used as they are easily evaporated off during the process, however, there is a risk that some solvent may remain in the scaffold which may be undesirable depending on the use of the construct.

HOW TO CONTROL FIBRE QUALITIES?

The results of fibre deposition are highly dependant on a variation of parameters, which can be sequentially altered in order to find the desired conditions for your fibres. These include

- Polymer viscosity and concentration
- Voltage applied to polymer
- Flow rate of fibre production
- Distance between needle and collecting duct
- Temperature of spinning environment
- Humidity of spinning environment
- Solvent used
- RPM of collecting drum (If used)