

# ELECTROSPINNER



The NanoSpider Lab 200 is a pilot-scale, needle free electrospinning system capable of the production of nanofibres ranging in diameter from 100nm-1 $\mu$ m. Due to the needle-less design of the system there is no possibility of the blockages often seen in bulk-scale electrospinning systems whilst maintaining multiple spinning sites to produce nanofibres at rates far exceeding lab-based systems. The nonwoven nanofibre mats produced by the system have applications in high-tech textiles, wound dressings, tissue engineering, nanoelectronics and other fields.

## FEATURES

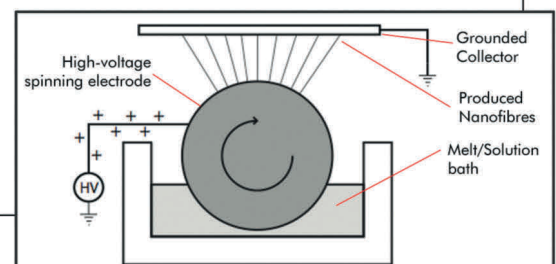
- Easy method to produce a wide range of fibre diameters down to the nanoscale.
- Ability to process a wide range of materials into nonwoven nanofibre mats.
- Multiple quick-change electrodes designed for high and low viscosity fluids.
- Variety of solution baths from <1 mL initial testing wells to 50mL production volumes.
- Bottom-up nanofabrication process means little to no material waste.
- Post-spinning processes can produce carbon nanotubes, zinc-oxide nanowires.
- Applications possible in a wide range of fields, from medicine to nanoelectronics.

## SPECIFICATIONS

- High voltage supply 0.1-80kV, max 1mA
- Fully interlocked, humidity controlled spinning chamber with attached fire extinguisher ensures safety.
- Installed in controlled-environment Class 10,000 BioClean room for cell seeding & processing experiments.
- 200mm spinning electrode.
- 400mm substrate for nanofibre collection
- Substrate feed of 0.13-1.5m/min allows continuous nanofibre production.
- Reciprocating substrate movement possible to allow charge relaxation and subsequent thicker mats of nanofibres.
- Up to 20 minutes continuous run time per batch.
- 2 minutes electrode change time.
- 5 minutes set up time.

## BENEFITS

- Relatively simple method to produce nano-scale features from a variety of materials
- Close proximity to experienced Rheology & Nano-characterisation facilities allows nano-fibres to be developed and perfected for your application rapidly.



## CASE STUDY

### WOUND DRESSINGS

The El Marco Nanospider LAB NS200 equipment is currently installed in the Centre for NanoHealth's Bio-Cleanroom facilities. In association with Pulse Medical Incorporated the system is being used to demonstrate and develop a scaled up electrospinning technique to produce nanofibres of a variety of synthetic and biological polymers for use in specialised wound dressings for EU, US and emerging markets. To date the Nanospider equipment has enabled *ex vivo* wound healing tests to be carried out using nano-structured cell scaffolds for bone repair.

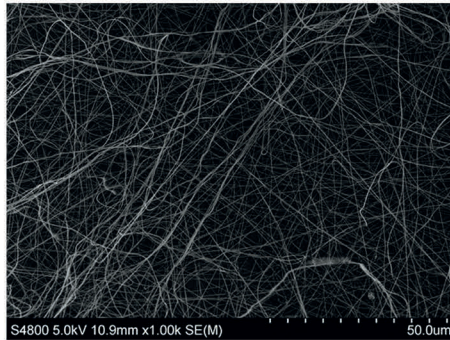


Fig 1. Poly(acrylonitrile) fibres electrospun using Nanospider System

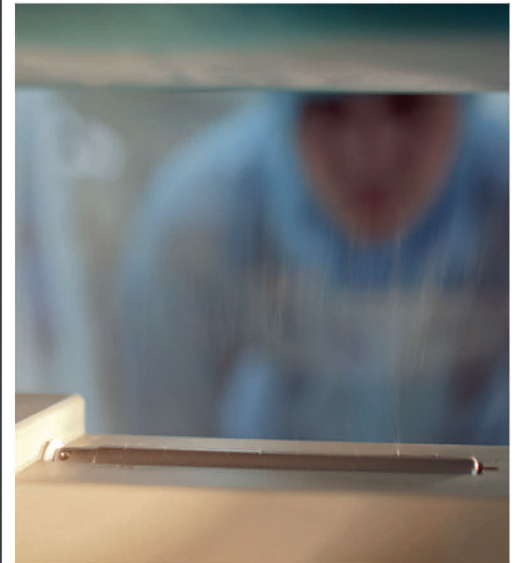


Fig 2: Taylor cones and electrospinning jets formed under electrostatic field between high voltage point (metal roller, lower) and ground (blue material, upper), in addition the non-woven fibre deposition can be seen as a white dusting on the blue collector substrate.

## APPLICATIONS

AREA OF INTEREST	APPLICATIONS
TISSUE ENGINEERING	<ul style="list-style-type: none"> <li>• Cell scaffolds.</li> <li>• Wound dressings.</li> <li>• Live-cell spinning into artificial matrices for <i>in vitro</i> tissue growth.</li> </ul>
FILTRATION MEMBRANES	<ul style="list-style-type: none"> <li>• Controlled fibre/pore diameter from micro- to nano-scale.</li> <li>• Range of materials possible for use in air or water filtration.</li> <li>• Large-scale 500mL spinning solution baths for bulk production.</li> <li>• Controllable humidity for porous fibres</li> </ul>
OTHERS	<ul style="list-style-type: none"> <li>• Micro/nano electronics - ZnO nanowires at high throughput</li> <li>• Carbon Nano-tubes possible via two-step annealing process</li> </ul>