



NANOGARD
TECHNOLOGIES

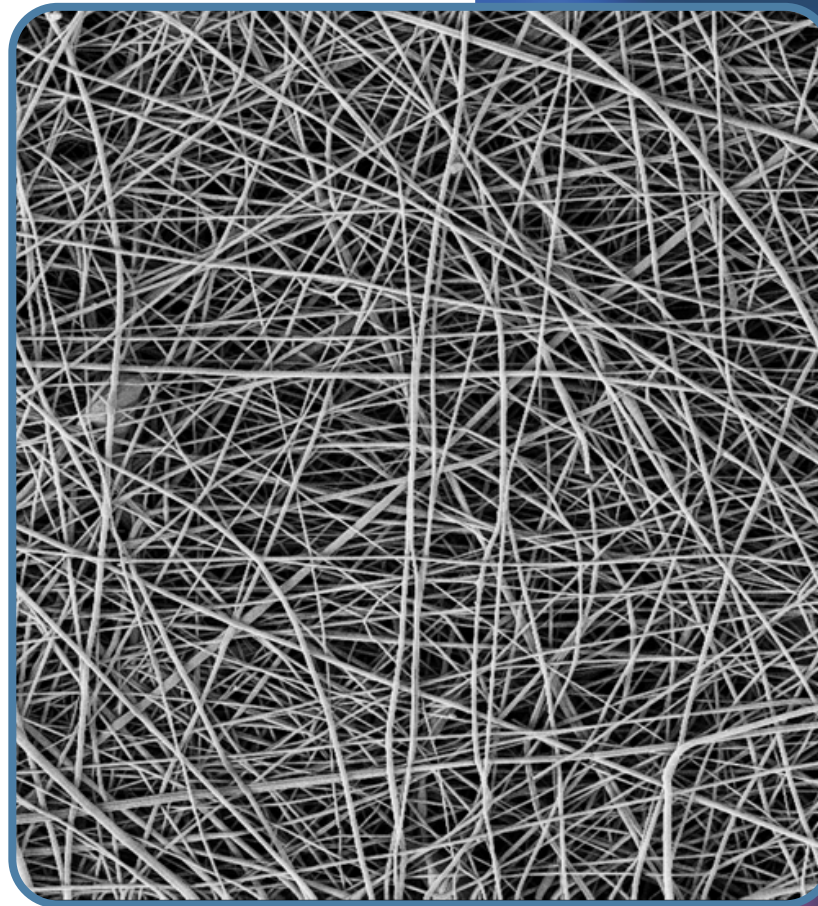




NANO GARD TECHNOLOGIES

Nanogard Technologies is a manufacturer of laboratory, semi-industrial and industrial electrospinning equipment and machines for using in the field of energy and energy storage resources.

Nanogard has a history of about two decades of experience in designing and manufacturing electrospinning machines and has published several US and WO patents.



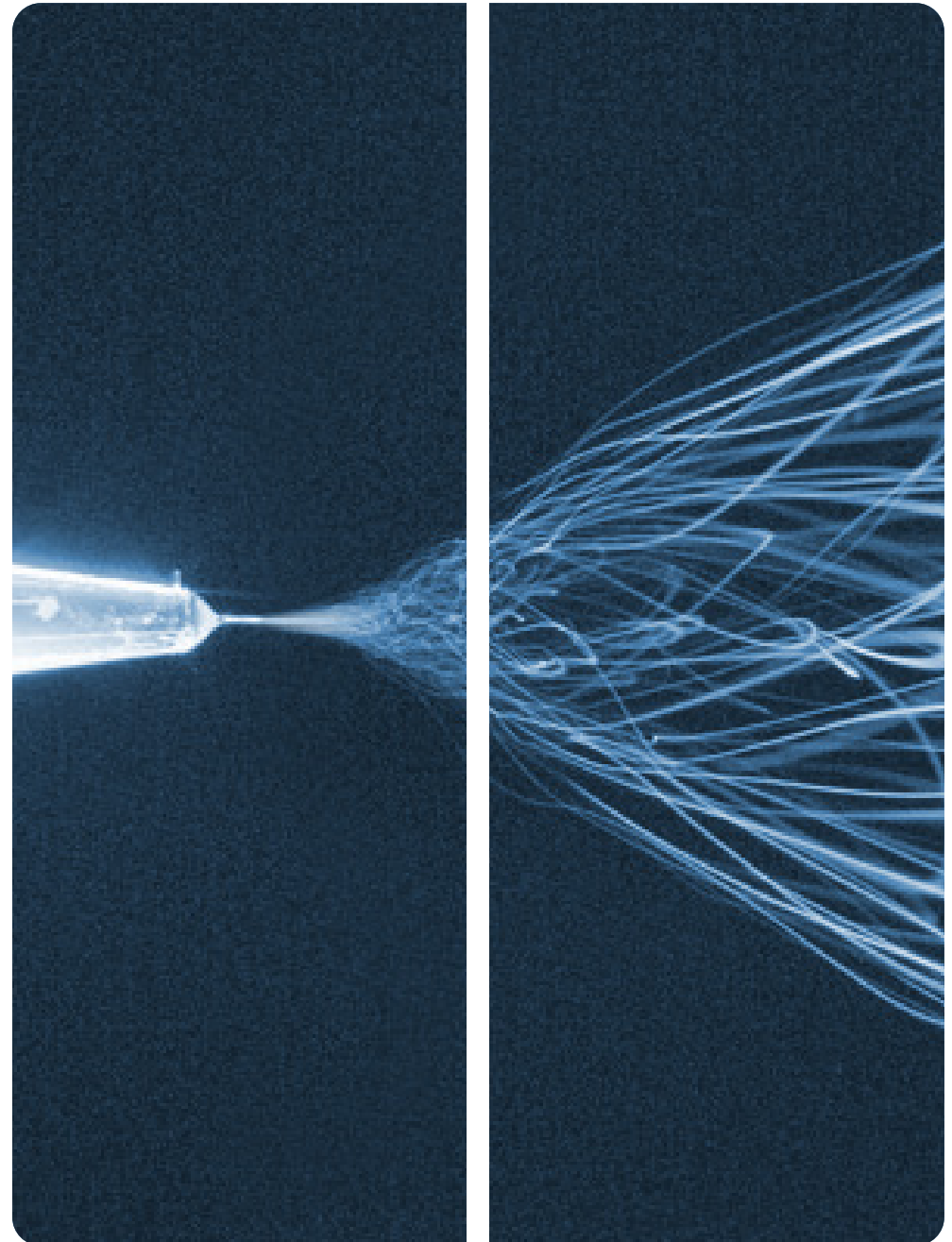
Electrospinning

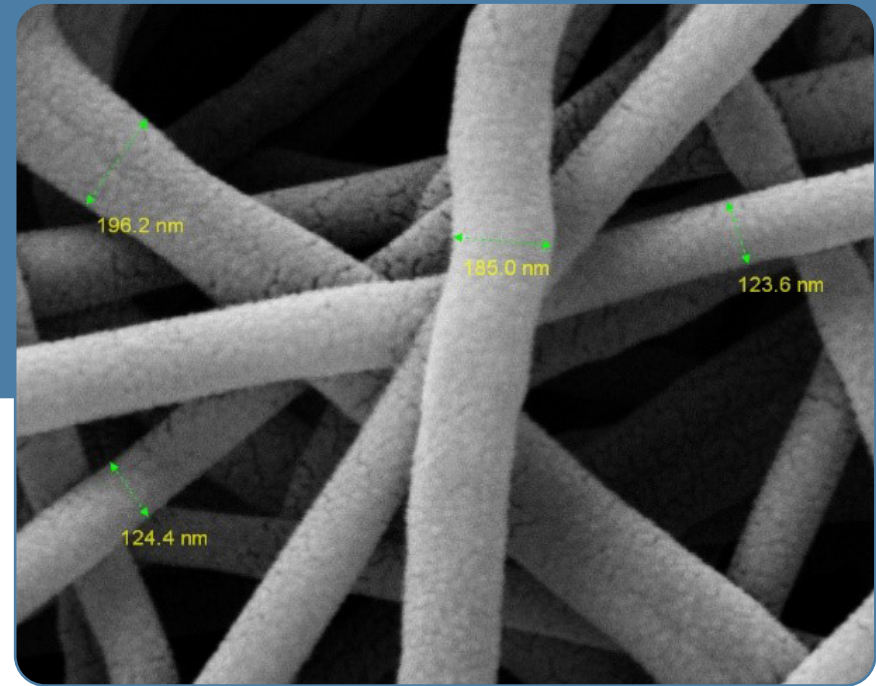
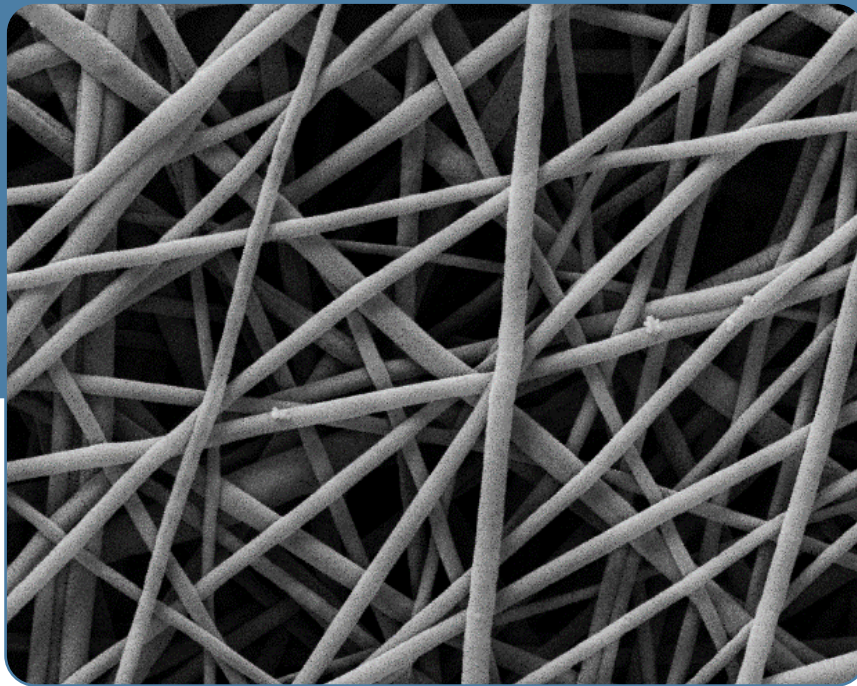
Nanofibers are fibers with a diameter of less than 1 micrometer. Nanofibers, with their small diameter and high active surface, have attracted a great deal of attention in multiple fields over the past few decades, and are rapidly entering various industries.

The two most common types of electrospinning are needle-electrospinning and needleless-electrospinning. The production speed of needleless electrospinning is usually higher. Despite this, it has some problems, such as non-uniform fibers and changes in solution concentration in the pond.

Generally, the low production speed of nanofibers has prevented them from being industrialized in many industries. At Nanogard, we have developed a blowing electrospinning method. The nanofiber production speed in this method is more than 20 times that of needle-based electrospinning and about 3 to 4 times that of needleless electrospinning.

Additionally, this method does not have needleless electrospinning issues. A high level of uniformity and quality is also achieved in its production.





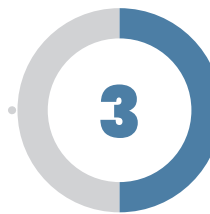
One of the industrial areas where nanofibers can bring massive transformation is energy and energy storage devices. In recent years, considerable research has been done in this area based on nanofibers and electrospinning, including:



Battery separator,
cathode, and anode



Dye-sensitized
solar cell



Fuel cell
catalyst support

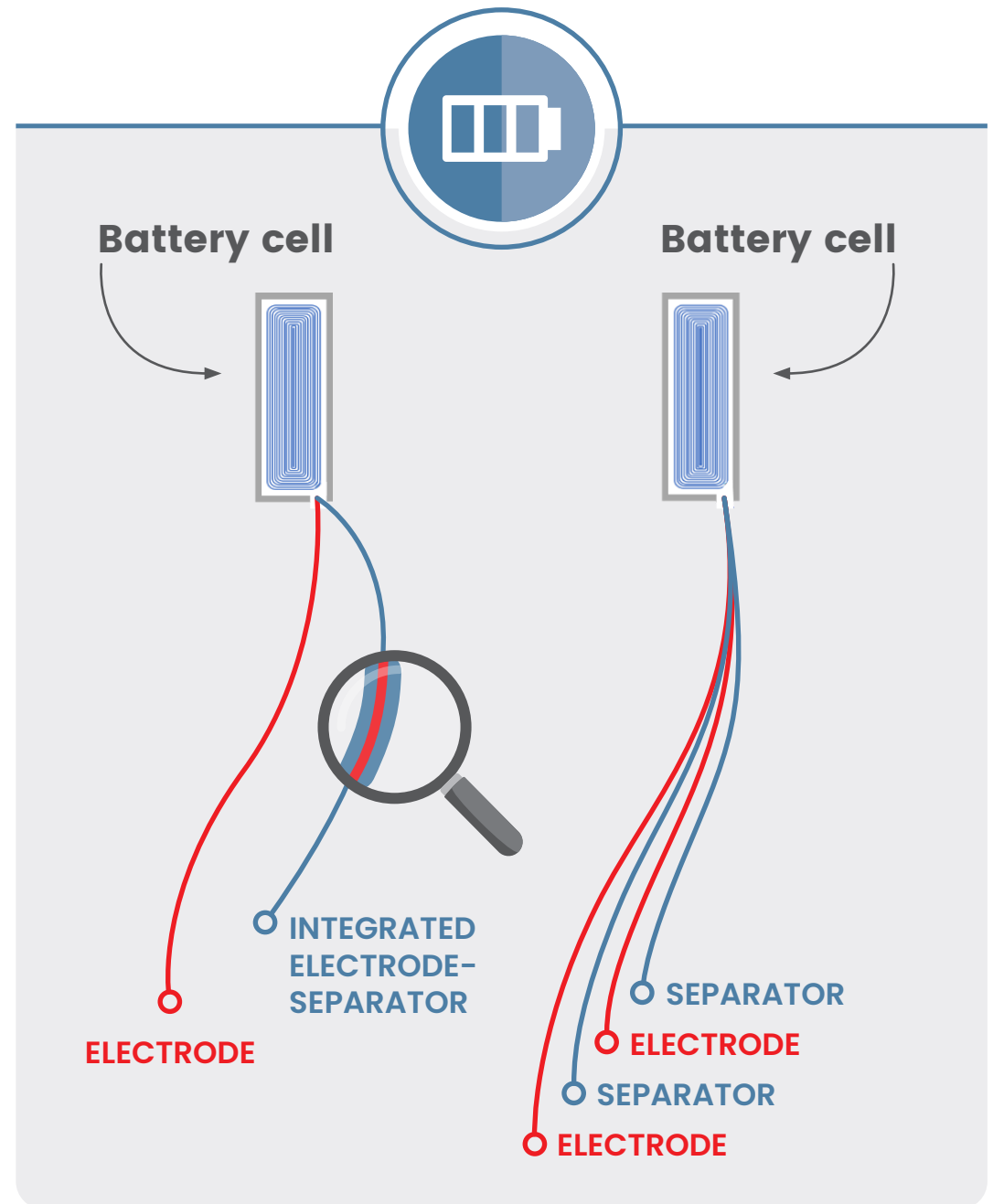


Supercapacitors

SEPERATOR

Next Generation Li-ion Battery Separator

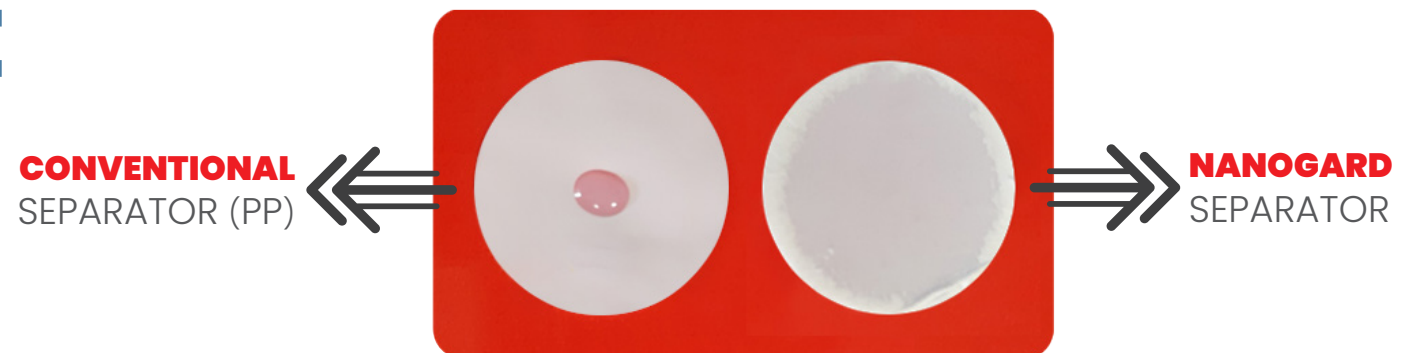
The Nanogard separator for lithium-ion batteries is produced via the blowing electrospinning method. This nanofiber separator is spun as a layer on the anode electrode and integrated with the anode. The number of battery core layers is reduced from 4 layers (two separator layers and two electrode layers) to two electrode layers (one cathode layer and one anode-separator integrated layer), thus increasing the cell production speed. Nanogard Separator owing to its high porosity and tortuosity, excellent electrolyte uptake, and remarkable thermal stability, improves the performance and safety of lithium-ion batteries.



THERMAL STABILITY



ELECTROLYTE UPTAKE



ADVANTAGES

1

Improve battery
safety

2

Increasing the
speed of core
drying & electrolyte
injection

3

Reducing the
number of cell core
layers (4 to 2)

4

Waste reduction
during stacking
and winding

5

Increasing the
speed of battery
assembling

6

Increasing the
rate of charging &
discharging

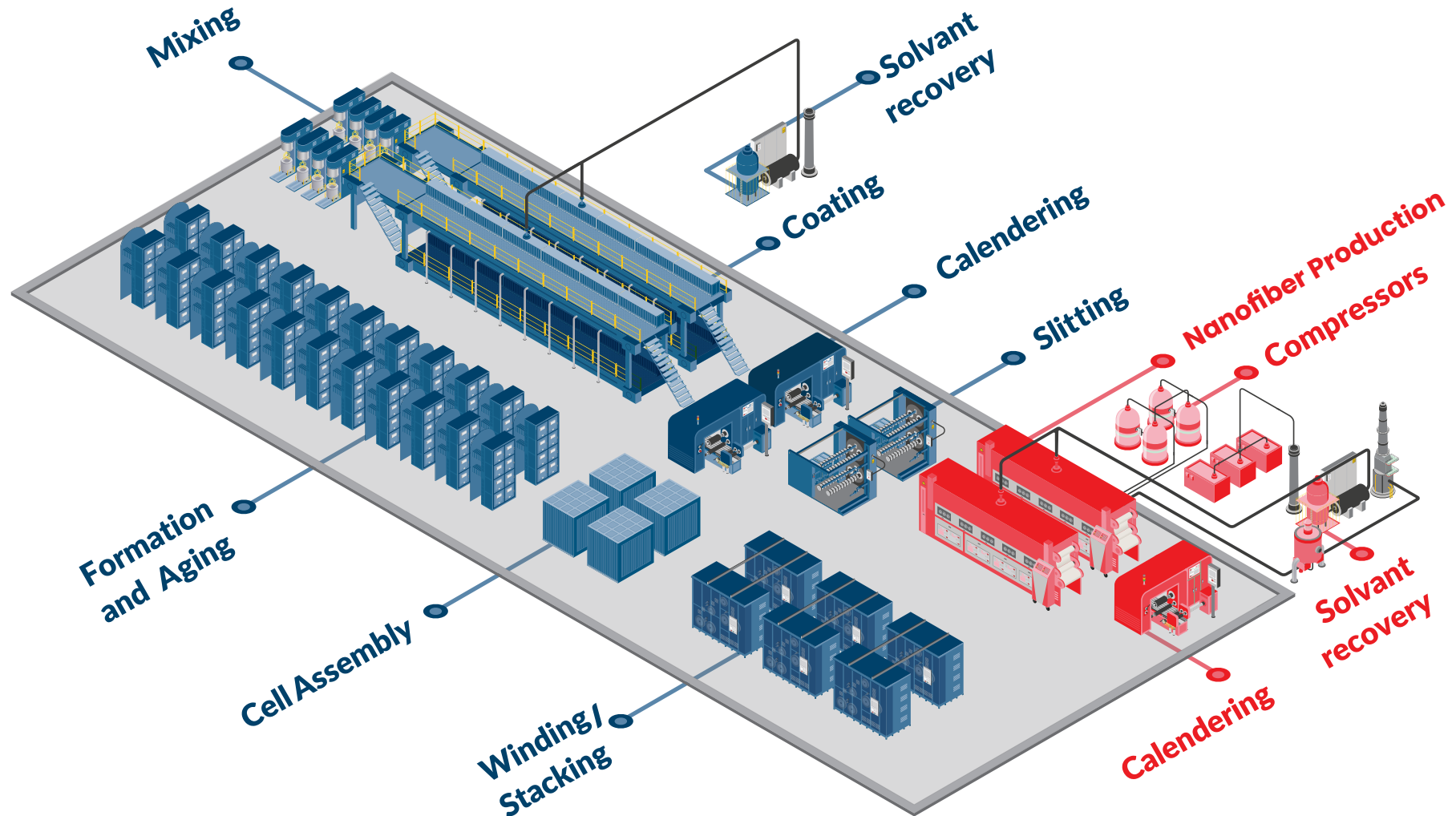
7

Reducing the
resistance inside
the cell

8

Extend
battery life

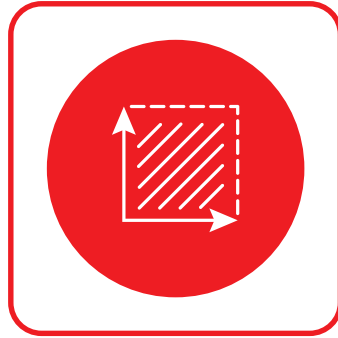
The Placement of Separator Production Machines In The Battery Production Line



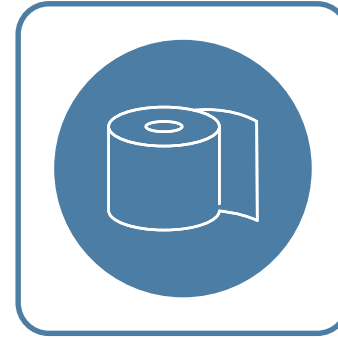
SPECIFICATION | EP320



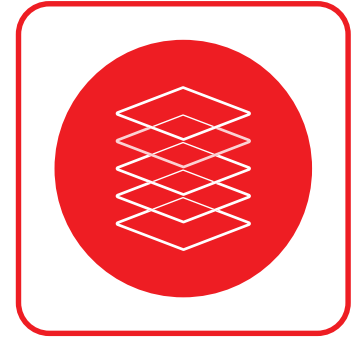
Simultaneous 2 Sided Coating
(Equal Quality On Both Sides)



Coating Any Width
With Any Thickness



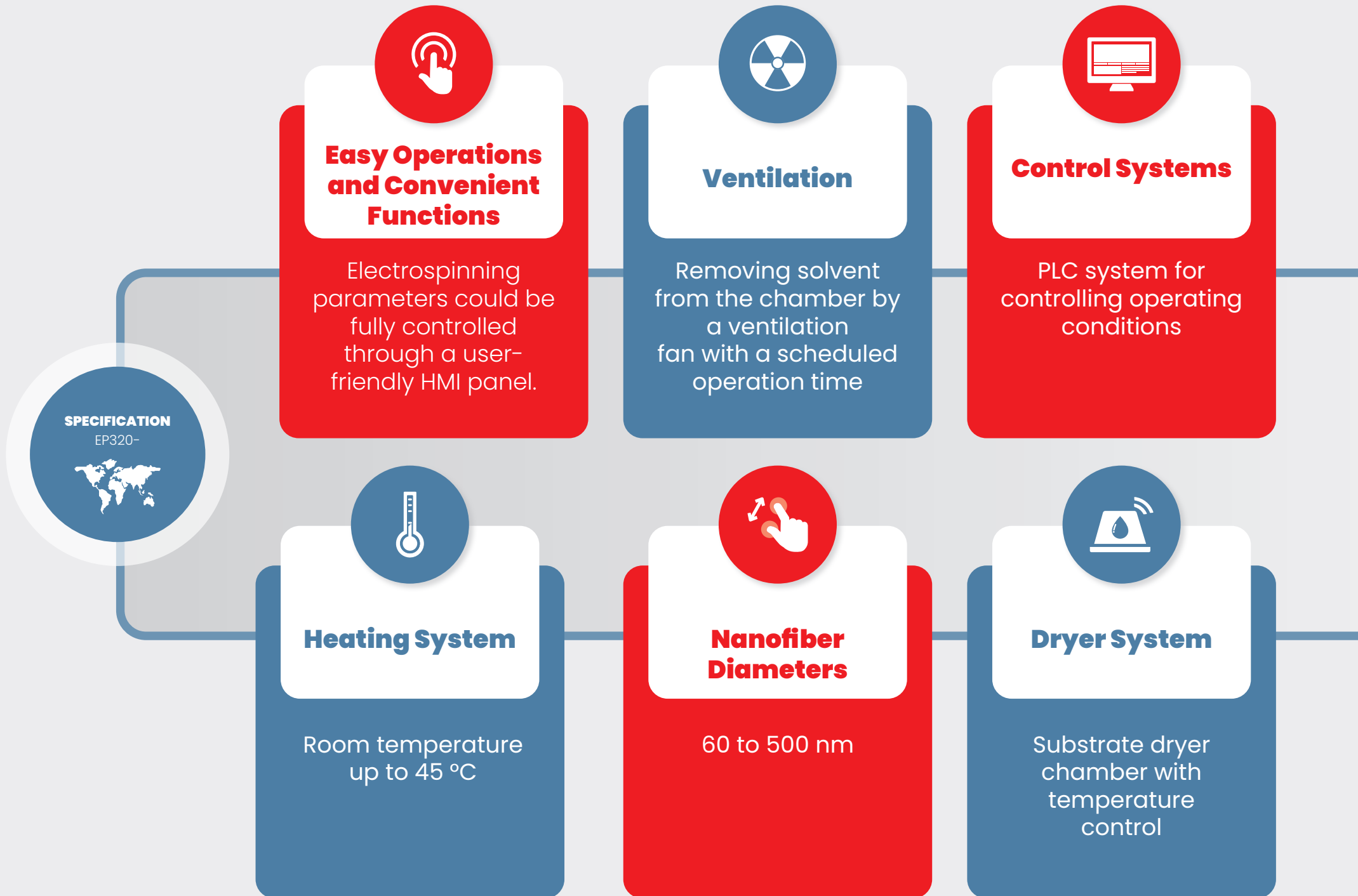
Roll To Roll Continuous
Production



Multi-Layer Coating With
Different Materials

Flexibility

- ➔ Various polymers and composites have the potential to be electrospun.
- ➔ High output in comparison with ordinary needles and needle-less electrospinning machines
- ➔ Different product specifications such as porosity, morphology, diameter, and ability to load beads can be obtained.
- ➔ The process is easy and economical.
- ➔ Different polymer types such as synthetic, biodegradable and natural polymers and composite may be processed.
- ➔ The production speed of **60 m²/hr** nanofiber separator with a thickness of **16 μm**



Laboratory & industrial

Models With Different Production Capacities Can be Designed and Built based on your needs!





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