



TL-BM Series

Biomedical Electrospinning Platform

Engineered for nanofiber membrane
research and production

BM-300 | BM-400V | BM-500 | BM-700

SHENZHEN TONGLI TECH CO LTD



Platform Features

Reliable, efficient and traceable nanofiber production for biomedical R&D and manufacturing.



Biomedical platform

Designed for biomedical R&D and clean production in GMP environments.



Versatile membrane fabrication

Flat sheets, tubular membranes, multilayer composites and complex structures.



From R&D to production

Connect laboratory development, process scale-up and batch production.



Digital process control

Automatic parameter logging supports full process traceability.



Stable spinning environment

A uniform electric field supports repeatability and batch-to-batch consistency.



Open, modular platform

Configure spinnerets, collectors and process modules as requirements evolve.

Biomedical Applications

Nanofiber membranes for biomedical applications and research.



Neural Repair

Dural substitutes
Nerve guidance conduits
CSF barrier membranes
Neural tissue scaffolds



Biological Barriers

Anti-adhesion membranes
Biological barrier membranes
Guided tissue regeneration
Wound isolation membranes



Vascular Repair

Vascular grafts
Vascular repair membranes
Vascular stent coatings
Cardiovascular scaffolds



Tissue Engineering

Corneal repair membranes
Pericardial repair membranes
Soft-tissue repair membranes
Periosteal repair membranes



GI & Urinary Repair

Abdominal hernia repair
Bladder repair membranes
Intestinal repair membranes
Gastrointestinal scaffolds



Skin & Aesthetic Repair

Wound repair membranes
Scar repair membranes
Aesthetic repair materials
Skin tissue scaffolds

TL-BM-300 | Benchtop Biomedical Electrospinning



Fabricates flat nanofiber membranes up to 300 × 300 mm.

Produces tubular membranes up to 300 mm long in a range of diameters.

Fabricates multilayer, multi-material nanofiber composites.

Combines microfibers and electrospun nanofibers for flat membranes, vascular grafts and other tubular tissue-engineering scaffolds.

TL-BM-400V | Vertical System

Flat nanofiber membranes up to 350 × 300 mm

Tubular membranes up to 350 mm long, in user-selected diameters

Flat sheets, tubes and complex 3D structures

Nanofiber–microfiber composite structures

Drug loading, ultrasonic spray coating and multilayer composite membranes

Custom combinations of process modules

Vertical Biomedical Electrospinning

Custom process modules



TL-BM-500 | Integrated Multi-Process System



Fabricates flat and tubular membranes with a working width of up to 500 mm.

Open platform compatible with a wide range of spinnerets, collectors and process modules.

One versatile system for research, laboratory trials and pilot production.

TL-BM-700 | Floor-Standing Production System

Fabricates flat and tubular membranes with a working width of up to 700 mm.

High-throughput electrospinning for continuous production at scale.

Stable production with high consistency and repeatability.



TL-BM-700-T | Modular, Demountable System



Demountable modular design simplifies transport, handling and on-site installation.

Fits through cleanroom doors, elevators and restricted access routes, reducing installation and modification costs.

Rapid on-site assembly supports efficient installation and reliable production start-up.

TL-BM-C | Custom Modular Production Line

Production workflow tailored to your process requirements.

Combine electrospinning, melt electrowriting, ultrasonic spraying and other processes.

Coordinate multiple systems for continuous production.

Centralized data management and full process traceability.

Expansion interfaces support future production-line upgrades.



TL-BM System Configuration Overview

01

Clean Environment & Safety

SS304 / 316

Clean stainless-steel enclosure

Ambient to 45°C
Humidity: 20–70% RH

UV disinfection | Door interlock
Emergency stop | Multi-point grounding

02

Bipolar HV & Intelligent Control

Positive: 0–30 kV | Negative: –30–0 kV
Programmable HV; touchscreen / buttons
Recipe recall; data logging, storage, export

03

Precision Solution Delivery

2–16 independent servo syringe-pump channels
0.02–99.99 mL/h; resolution: 0.01 mL/h
Theoretical maximum thrust: 353 N

04

Versatile Spinneret System

Single, microcapillary, coaxial and triaxial
Sea-island, side-by-side,
low-volume, V-array
Automatic cleaning; X-axis traverse

05

Versatile Fiber Collection

Flat sheets, tubes, fiber yarns and 3D scaffolds
Random or aligned fiber deposition
Width: 300–700 mm | Up to 5000 rpm

06

Expansion & Customization

Optional

Roll-to-roll · Melt electrowriting · 3D gas-assisted electrospinning · Ultrasonic spraying
Cold/hot stage · Liquid bath · Magnetic field · Nanoparticles · In-situ microscopy
Enhanced dehumidification · Exhaust filtration

Positive & Negative HV Supplies

± 30 to ± 50 kV

Stable high-voltage output for reliable, repeatable electrospinning.



Independent positive/negative outputs

Flexible settings for different processes.



One negative and multiple positive supplies

Optional multi-output HV configuration.



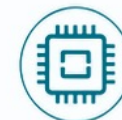
Stable HV with automatic compensation

Real-time monitoring maintains stable output.



Comprehensive electrical protection

Overvoltage, overcurrent, arcing and short-circuit protection.



Industrial-grade insulation

Button and touchscreen control for safe, convenient operation.

Intelligent Control System

Digital control of the electrospinning process

01

Centralized process control

Manage HV, solution feed, motion and environmental parameters with real-time monitoring and coordinated control.

02

Adjust parameters during operation

Change process conditions online to respond quickly to experimental needs.

03

Touchscreen and physical controls

Intuitive touchscreen operation with convenient, reliable shortcut buttons.

04

Recipe storage and recall

Save settings and experiment records for traceability and reproducible processing.

Centralized settings, run monitoring and recipe records; expandable to suit the configuration.



Multi-Channel Servo Syringe Pump

Precision delivery for stable electrospinning



Independently programmable channels

Expandable to suit your requirements.



Servo drive

Accurate and stable flow control.



High-thrust design

Suitable for high-viscosity solutions.



HV-resistant insulation

Designed for electrospinning environments.



External High-Capacity Syringe Pump

Precise delivery · Stable spinning · Controlled output

01

Long-duration continuous operation

Higher capacity supports uninterrupted feeding for pilot and production-scale processing.

02

Higher production capacity

Coordinated channels maintain stable, consistent delivery and improve overall output.

03

Flexible installation

Separate pump unit connected to the spinnerets by tubing, for flexible installation.

04

Coordinated multi-spinneret operation

Integrates with multiple spinnerets and continuous collectors for efficient process coordination.

Capacity and channel count configurable for the process and required output.



Programmable Syringe Pump

For complex fiber
membrane architectures



Flow rate: 0.01–99.9 mL/h

Syringes: 10 mL, 20 mL and 50 mL (custom); other sizes configurable

Programmable flow-rate steps: 99

Program memory: 99 individually named programs

Interface: 7-inch touchscreen

Humidity Control System

Process humidity range: 20–80% RH

- 01** | **20–80% RH**
Process humidity control range.
- 02** | **Standard dehumidifier**
Down to 30% RH at room temperature.
- 03** | **Enhanced dehumidifier**
Down to 20% RH at room temperature.
- 04** | **Mist-free humidifier**
Reduces droplet deposition and local humidity fluctuations.

Both a humidifier and a dehumidifier can be fitted.
Select one to operate at a time.



Dust-Free Heating System

A stable, clean and controlled thermal environment

01

Continuously adjustable from ambient to approximately 45°C

02

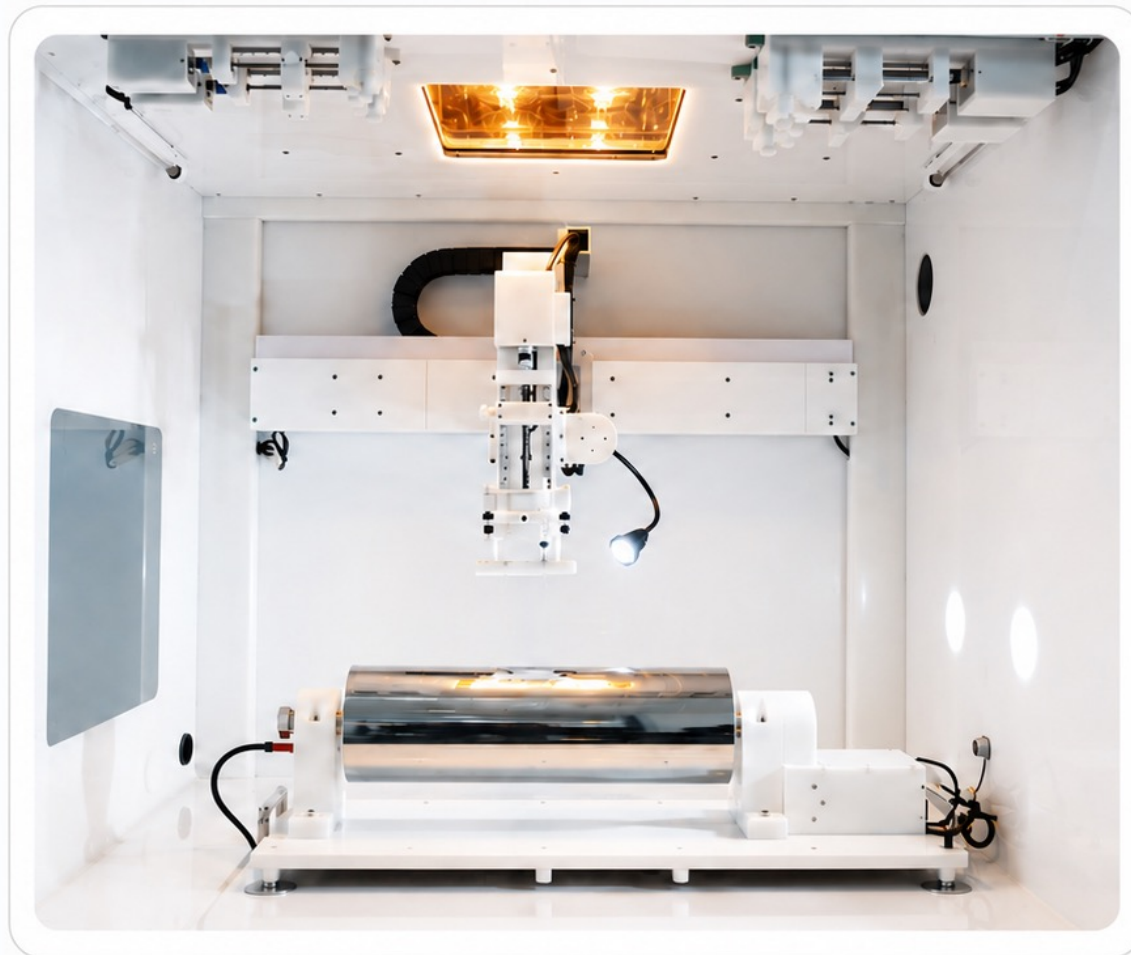
External heat source avoids disturbing the electrostatic field

03

Uniform heating across a large working area

04

Multi-zone temperature control for spinnerets and collectors



Heated Rotating Collectors (Optional)

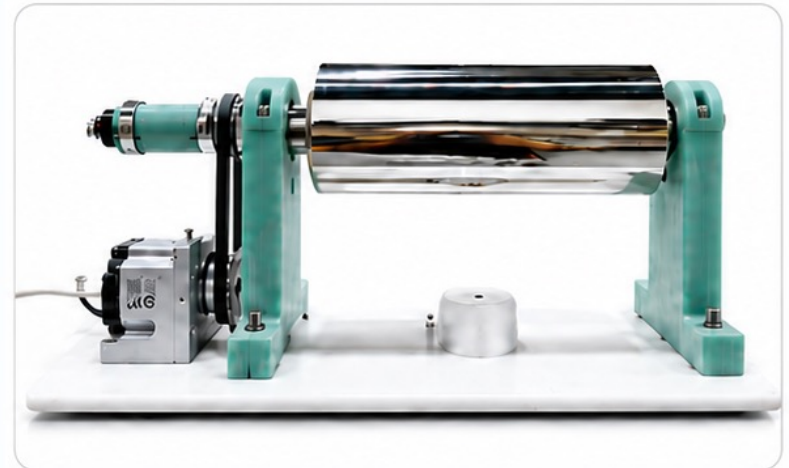
Independent heating for low-volatility solvents and hot collection

Mandrel heating: up to approximately 60°C

Drum heating: up to approximately 140°C

Independent mandrel and drum heating to suit the process

Compatible with specialty materials and thermally assisted electrospinning



Modular Spinneret Platform

Side-by-side, coaxial, sea-island, direct-writing, multi-jet and gas-assisted modules

Standard modules and optional extensions can be changed to suit the material system and process.

01 | Parallel / Side-by-Side

Direct syringe-fed dual spinnerets
Side-by-side spinneret
Rotating side-by-side spinneret

02 | Coaxial / Triaxial

5 pairs of coaxial needles
5 triaxial spinneret sets
Multilayer fiber architectures

03 | Sea-Island Multi-Channel

Two-channel sea-island spinneret
Three-channel sea-island spinneret
Multi-component composite fibers

04 | Near-Field / Melt Electrowriting

Solution near-field direct writing
Melt electrowriting (up to 150°C)
Filaments and patterned structures

05 | Multi-Needle / Multi-Spinneret

V-array: 8–12 needles
Linear, circular and matrix arrays
Conjugate and coaxial
multi-jet systems

06 | Gas-Assisted / Specialty

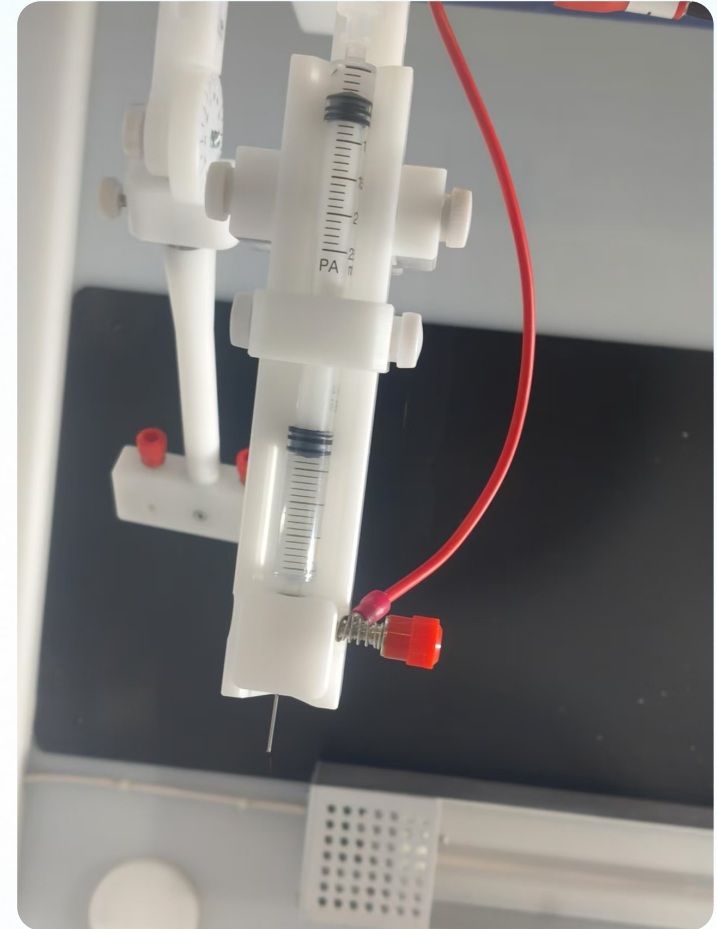
Gas-assisted electrospinning
Centrifugal spinnerets
Ultrasonic nozzles and more

Low-volume R&D · Multi-component fibers · Direct writing · Small-scale production · Gas-assisted 3D fibers (optional)

Low-Volume Spinneret

Direct syringe connection—no tubing required

- 01 The needle connects directly to the syringe, minimizing consumption of costly materials.
- 02 Run electrospinning trials with just 0.5 mL of solution.
- 03 Optional configuration with 2–4 low-volume spinnerets operating simultaneously.



Glass Micropipette Spinneret

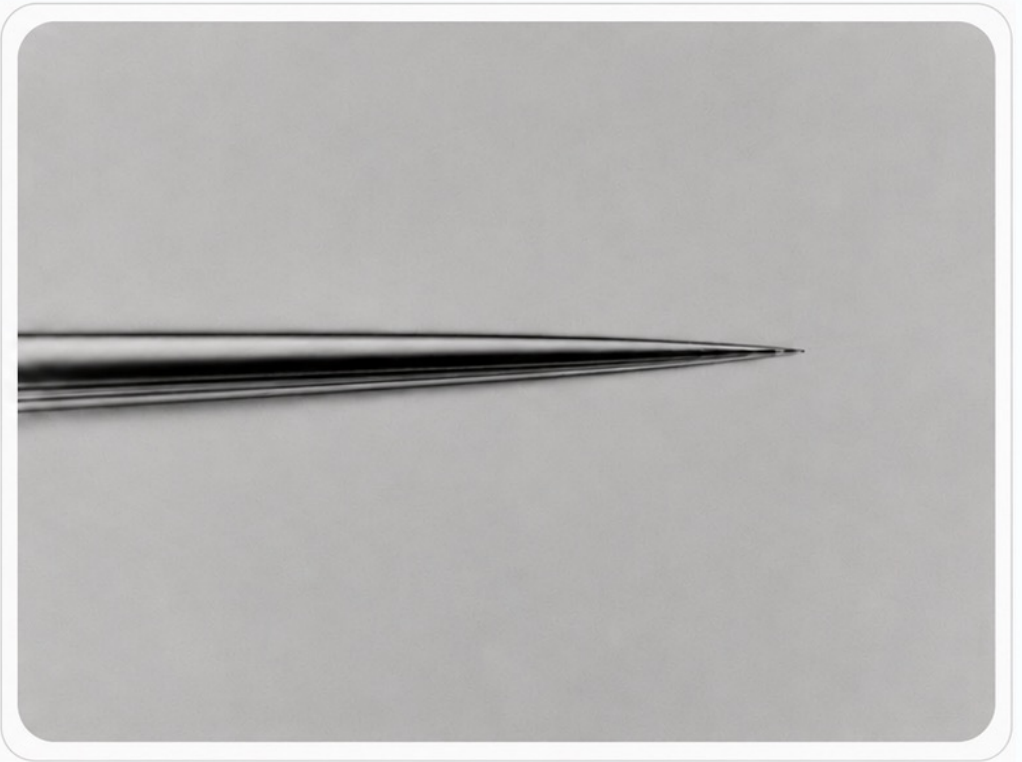
Fine fluid control for micro- and nanoscale direct writing

Microchannel diameters from 1 to 45 μm

Suitable for ultrafine nanofiber fabrication

Supports micro/nanopatterning and near-field direct writing

For low-viscosity fluids and low-volume experiments



Coaxial Spinneret

Reliable fabrication of core-shell fibers

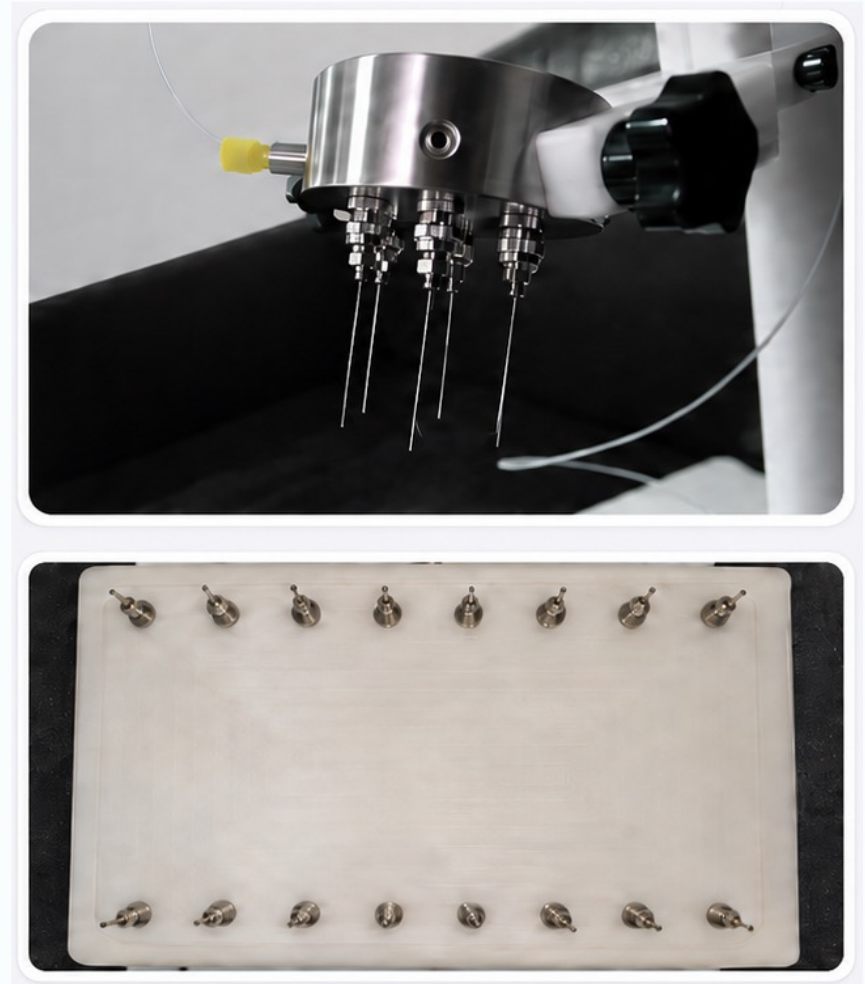
- High concentricity of inner and outer needles supports a stable core-shell structure
- Interchangeable needle sizes for flexible combinations
- Inner and outer needles detach independently for rapid replacement
- Supports gas assistance and lower onset voltages



Circular / Array Coaxial Spinnerets

Scale coaxial spinning from one needle to parallel multi-jet operation

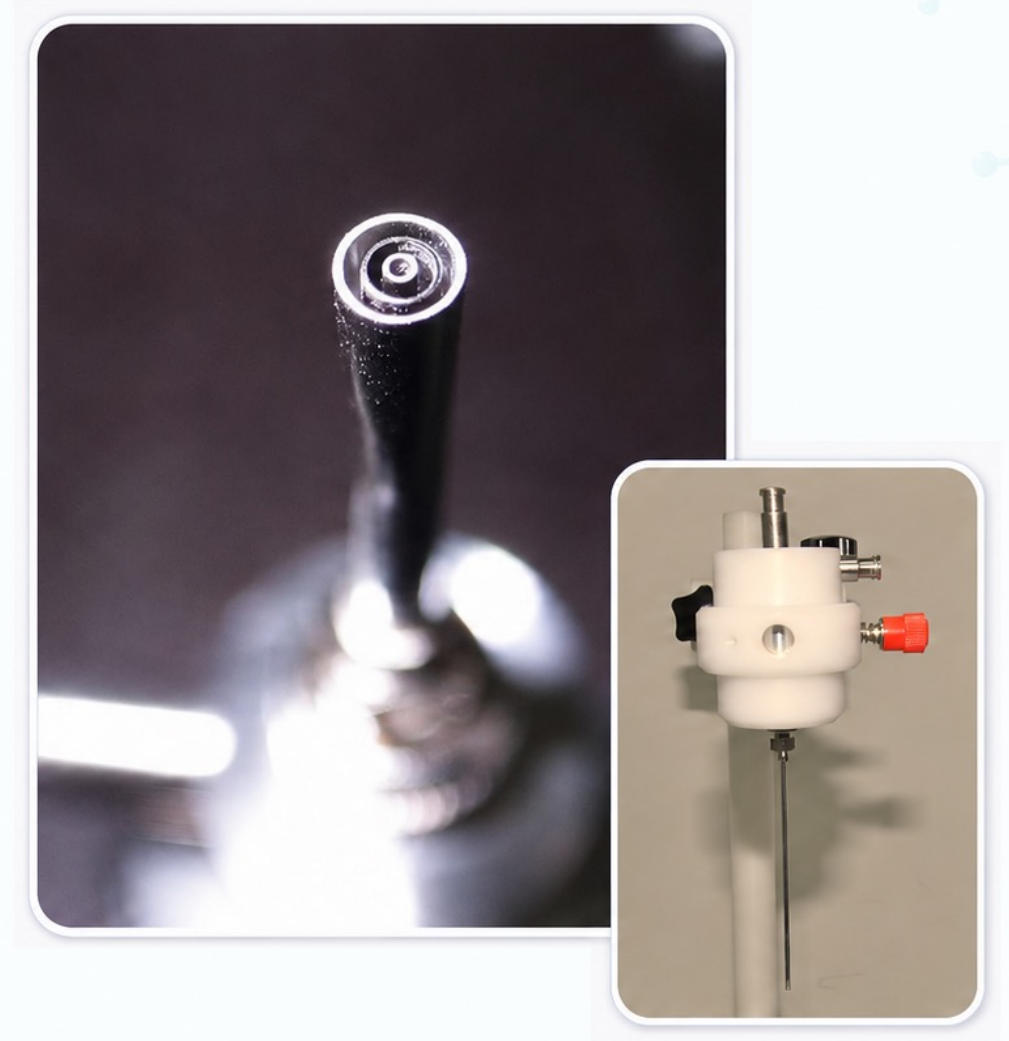
- 01 Circular or matrix layouts configurable for the required output
- 02 Simultaneous multi-jet operation increases core-shell fiber output
- 03 Optimized spacing reduces electric-field interference
- 04 For pilot-scale expansion and continuous composite fiber production



Triaxial Spinneret

Multilayer composite fibers and multi-shell architectures

- Three independently supplied fluid channels
- Precision concentric machining supports stable jetting
- Modular combinations of different needle sizes
- For multilayer drug-delivery systems and functional fiber research



Coaxial / Triaxial Needle Sizes

Coaxial Needle Combinations

Inner needle	Outer needle
20G	14G
14G	10G
21G	15G
15G	11G
22G	16G
16G	12G
23G	17G
17G	13G
24G	18G
18G	14G
26G	19G
19G	15G

Triaxial Needle Combinations

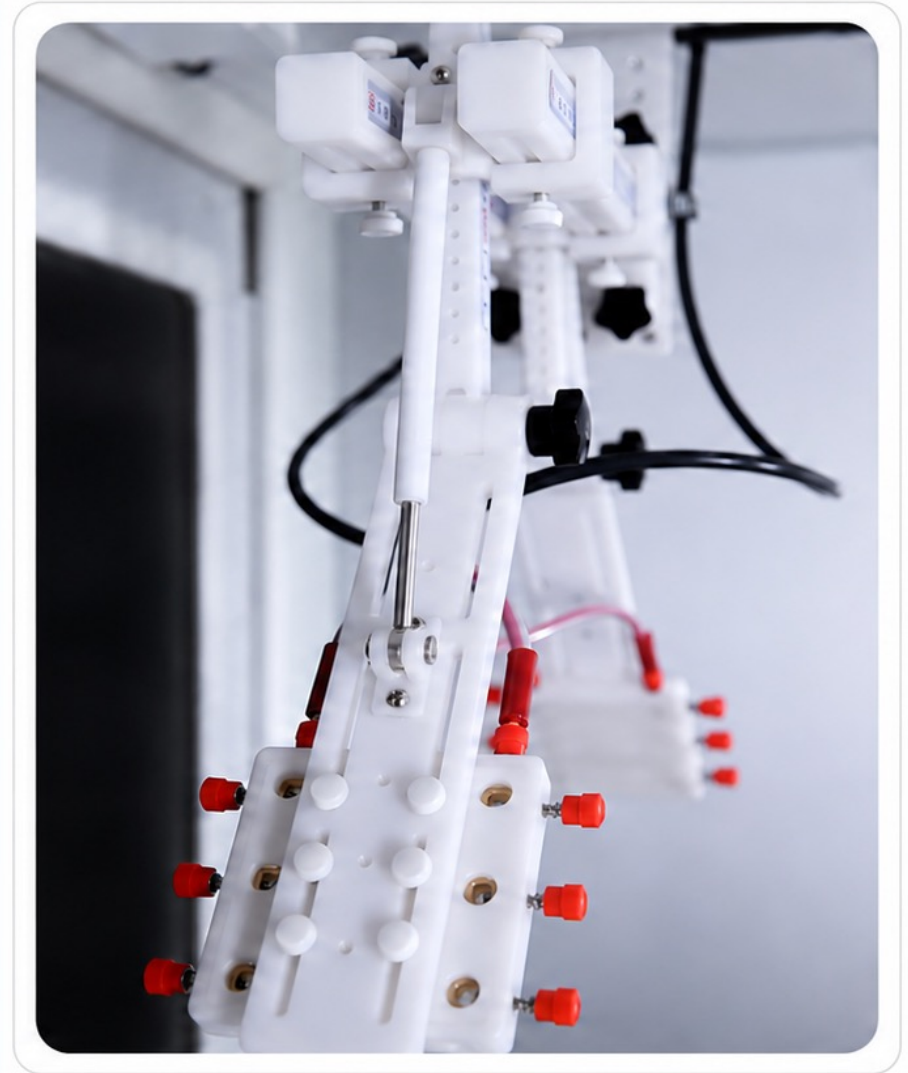
Inner	Middle	Outer
26G	20G	16G
27G	21G	16G
27G	20G	16G
25G	20G	16G
27G	18G	14G
22G	18G	14G
26G	18G	14G
21G	16G	13G
25G	16G	13G
20G	14G	11G

Multiple needle combinations for core-shell, multilayer composite and functional fiber research.

V-Array Multi-Needle Spinneret

A versatile configuration for R&D and scaled production

- | Supports simultaneous operation of 2N needles
- | V-shaped geometry improves membrane uniformity
- | Precisely adjustable spinneret angle and spacing
- | Supports conjugate spinning and combined spraying/spinning; each side can receive a different positive HV setting



Conjugate Electrospinning Spinnerets

Opposite-polarity jets for specialty fiber structures

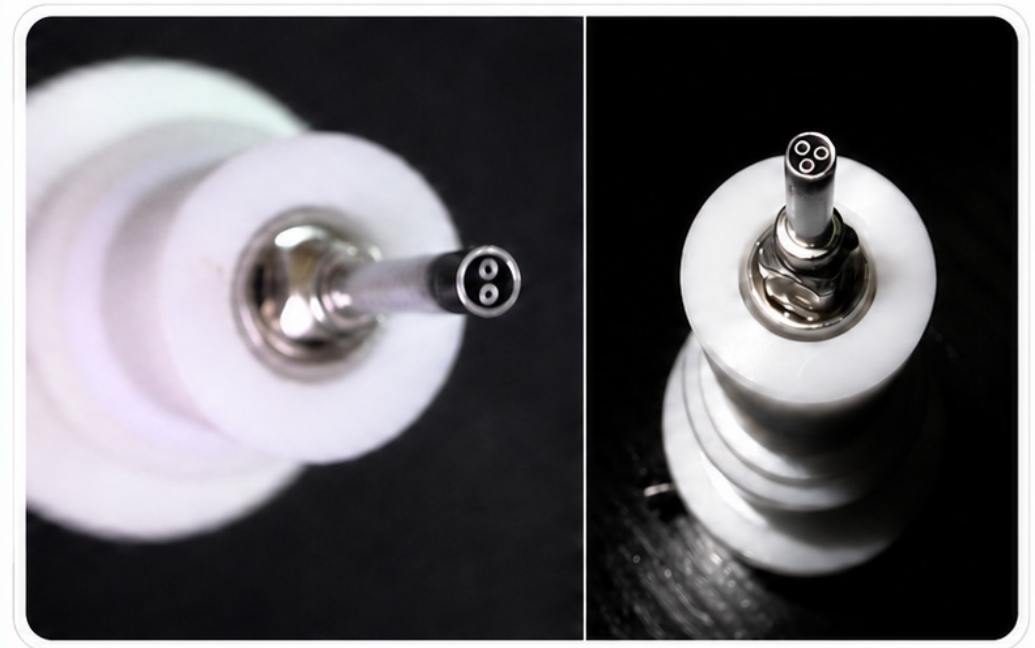
- | Coordinated positive and negative high-voltage spinning
- | Reduces charge accumulation and improves layer uniformity
- | Simultaneous spinning of two materials
- | Reduced inter-spinneret interference improves process stability



Multi-Channel Sea-Island Spinneret

Complex cross-sections and multi-component functional fibers

- | Two- and three-channel sea-island configurations
- | Simultaneous spinning of three or more materials
- | Sea-island, cable-like and other specialty fiber cross-sections
- | Independent material supply and control for each channel



Side-by-Side Spinneret

Independent dual-material delivery for bicomponent fibers



Independent flow-rate adjustment for both channels



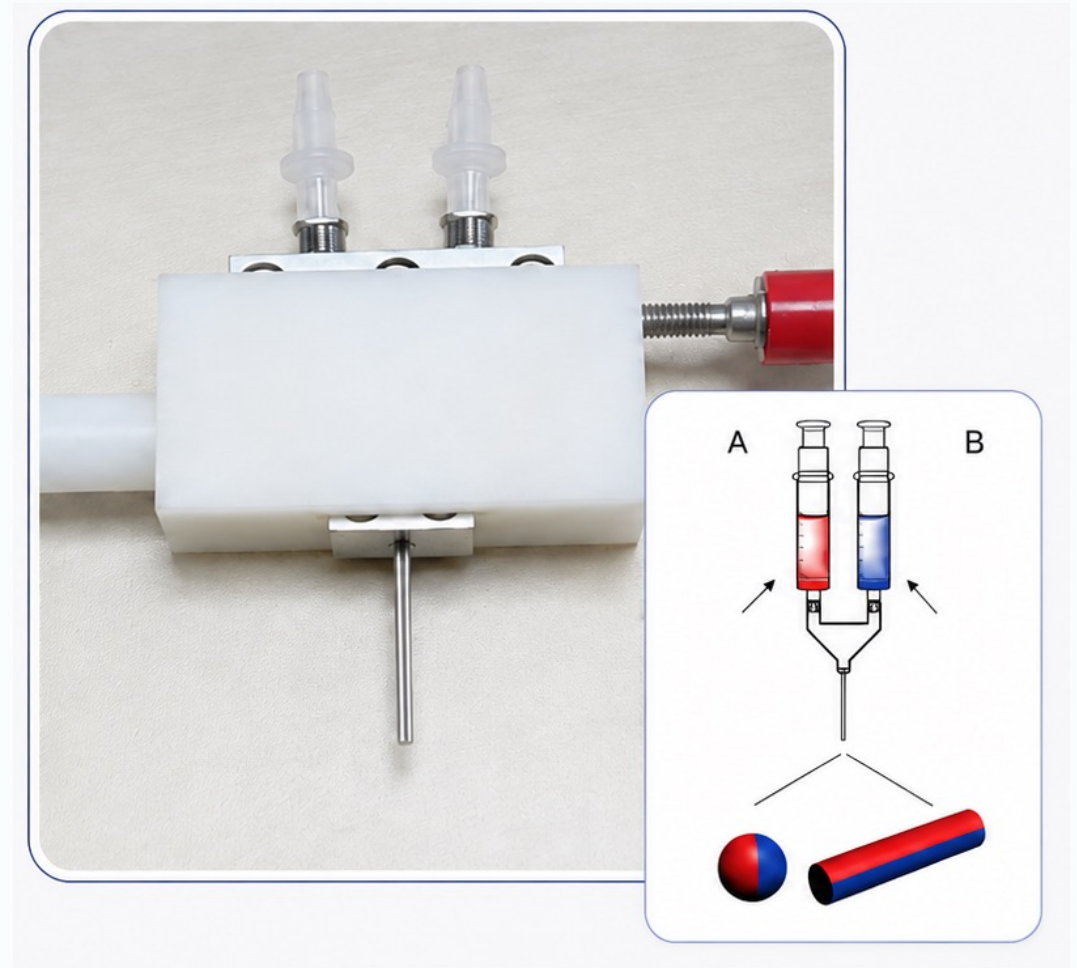
Stable simultaneous spinning of two materials



Compatible with different needle sizes and material combinations



For Janus, self-crimping and functional composite fibers



Linear / Circular / Matrix Spinneret Arrays

1-in/N-out or N-in/N-out configurations tailored to the process



Custom spinneret count, arrangement and spacing



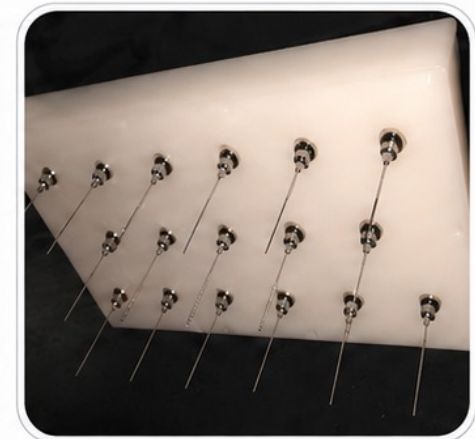
Stable parallel operation increases fiber output



Optimized layout improves membrane uniformity



Suitable for laboratory work, pilot trials and continuous production



Automatic In-Process Needle Cleaning

Minimize clogging and maintain continuous spinning stability



Cleans needles during operation without stopping the system



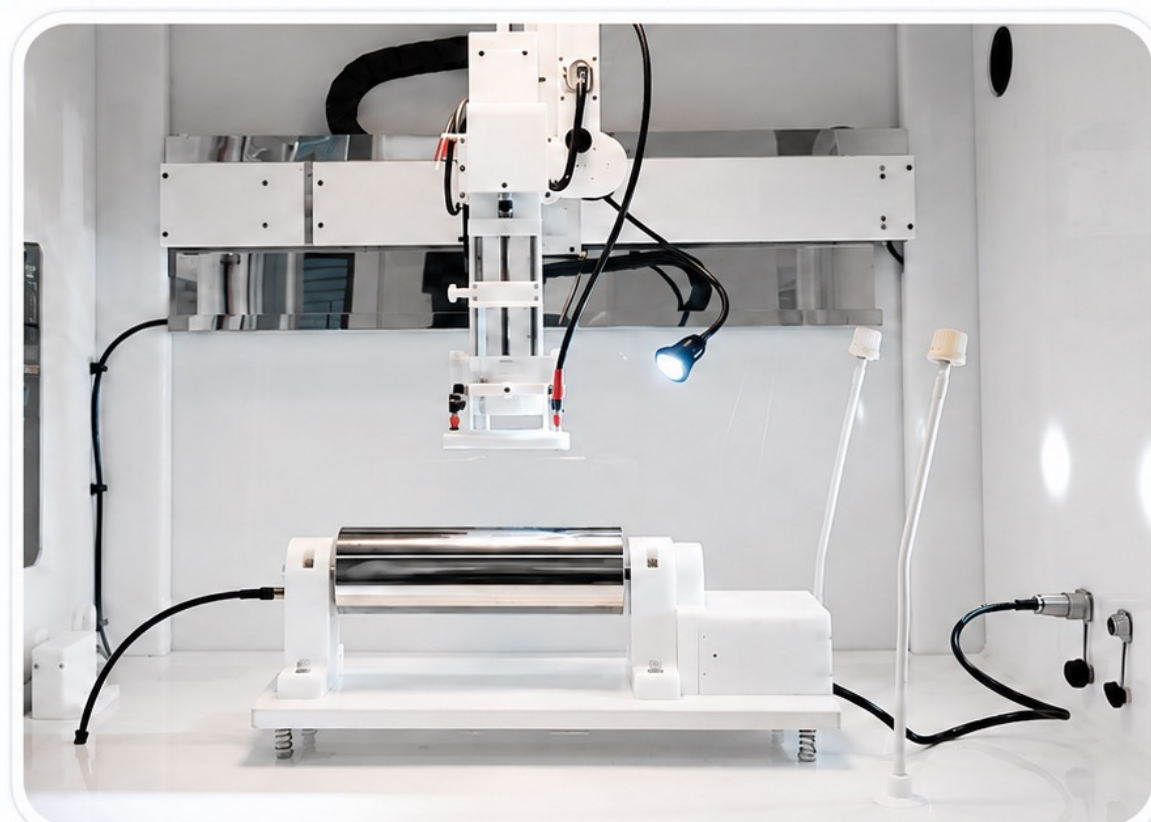
Cleaning frequency adjustable to solvent volatility



Reciprocating needle motion with automatic cleaning



Especially suitable for volatile-solvent systems



Spinneret Motion System

Uniform coverage across every nanofiber layer



Precision X-axis traverse:
approximately 600 mm travel;
speed: 1–40 mm/s



Adjustable X-axis acceleration and
deceleration; settings can be
recalled on the touchscreen



Precision Z-axis motion:
approximately 200 mm travel



Optional Y-axis motion stage for
coordinated three-axis operation



Nanofiber Collection Systems

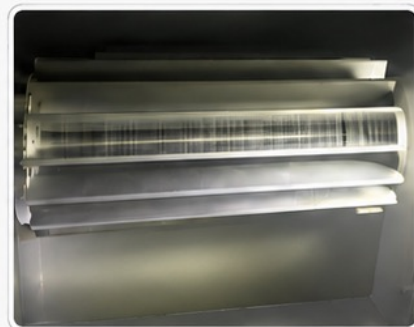
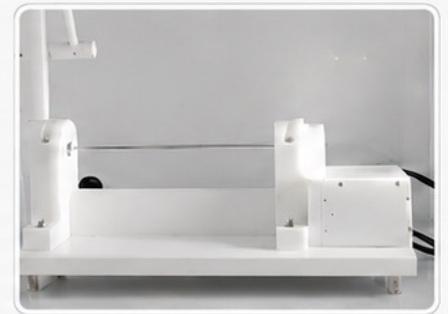
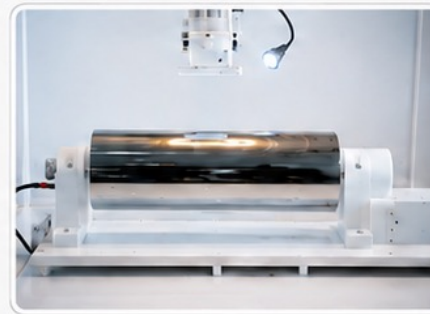
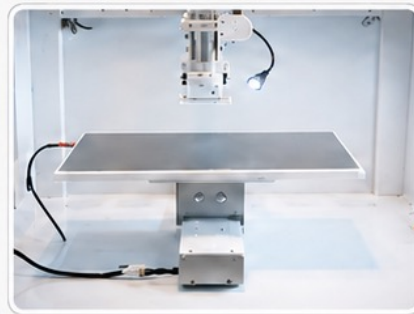
Choose the collector to define the fiber architecture

Flat membranes, tubular membranes and aligned fibers

Microfilaments, yarns and thick porous fiber mats

Continuous webs and large-area patterned deposition

Lofted 3D fibers and multilayer composite structures



Large-Area Rotating Drum Collector

Uniform collection of flat and tubular nanofiber membranes



Drum 1: $\text{Ø}159 \times 500$ mm
1–600 rpm (± 1 rpm)



Drum 2: $\text{Ø}100 \times 300$ mm
1–500 rpm (± 1 rpm)



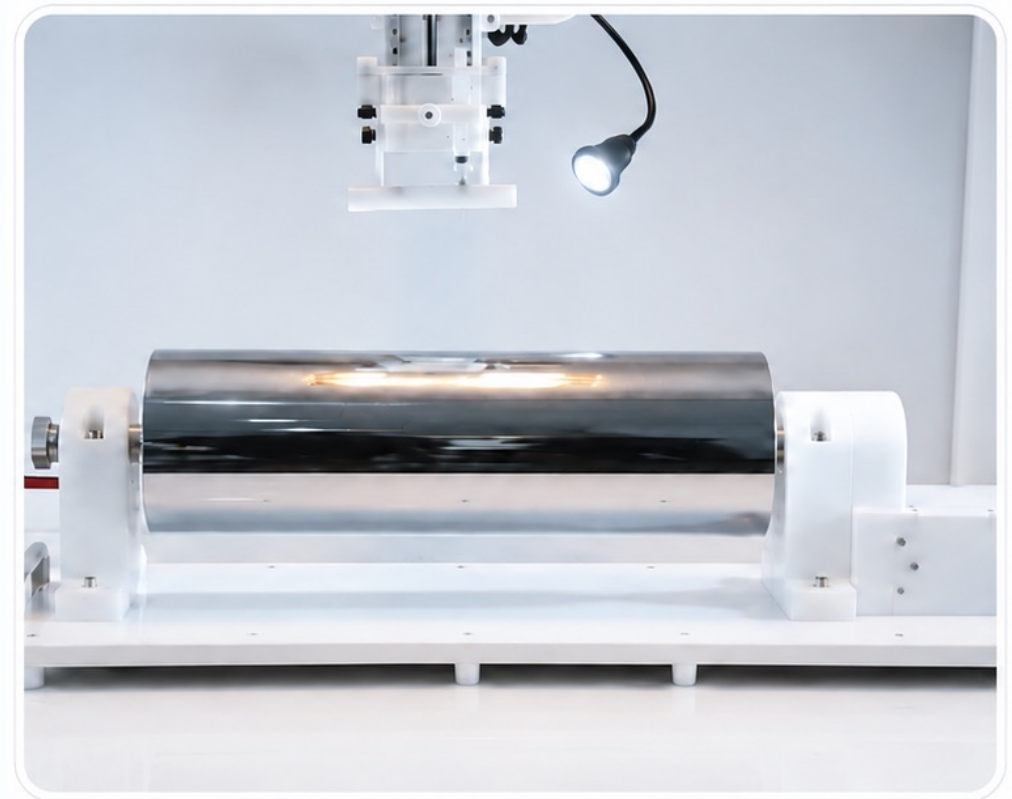
Drum 3: $\text{Ø}219 \times 700$ mm



Custom drum dimensions available



Supports random and aligned fiber deposition



Rotating Disc Collector

Collect highly aligned fibers along the disc edge



Rotational speed: approximately 1–5000 rpm



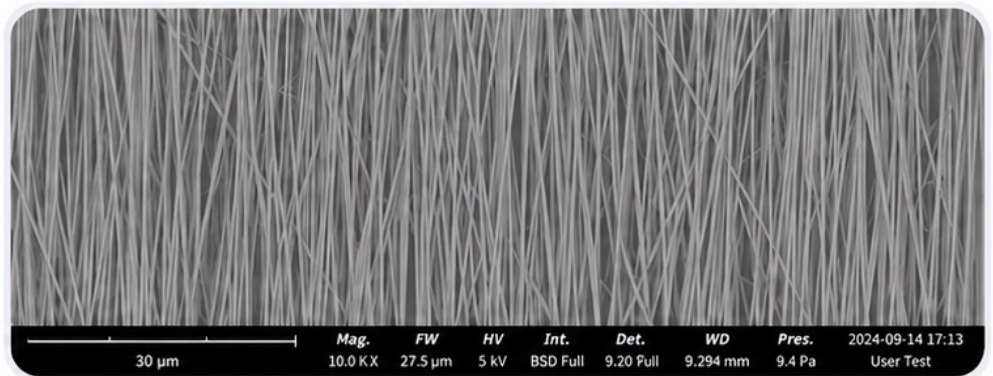
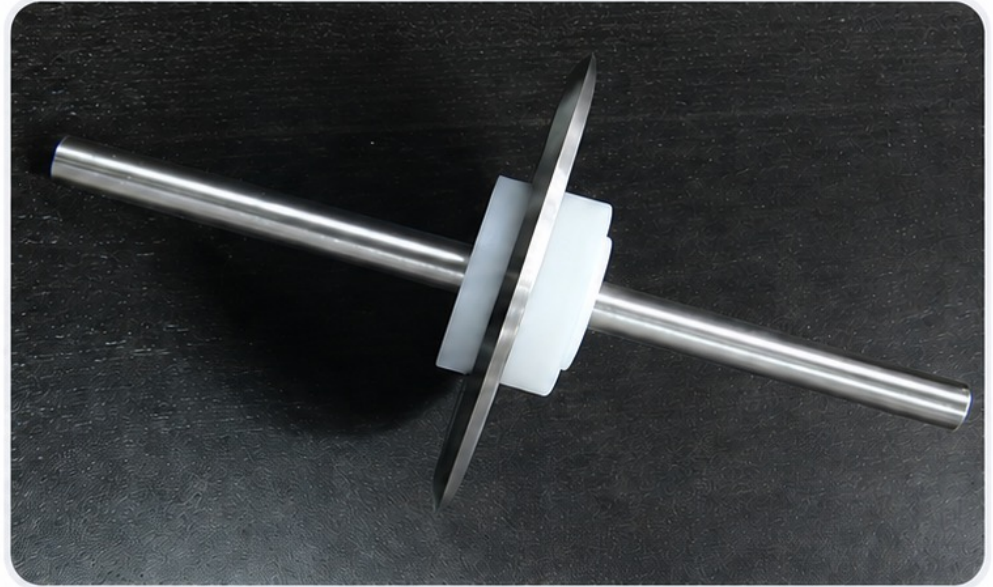
Disc diameter: approximately 180 mm



Adjustable fiber ribbon width



For narrow, highly aligned fiber ribbons



Rotating Collector for Highly Aligned Fibers

Stable collection of narrow, highly aligned fiber structures



High-speed rotation promotes strong fiber alignment



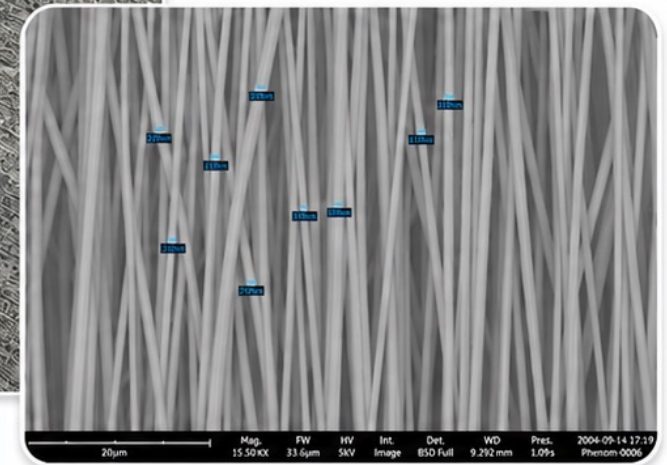
Rotational speed: approximately 1–5000 rpm



For highly aligned membranes and fiber bundles



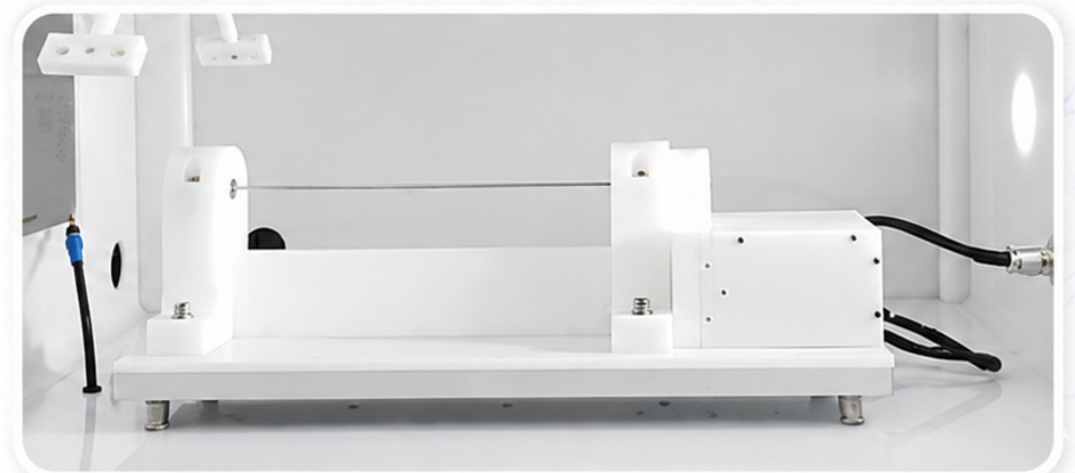
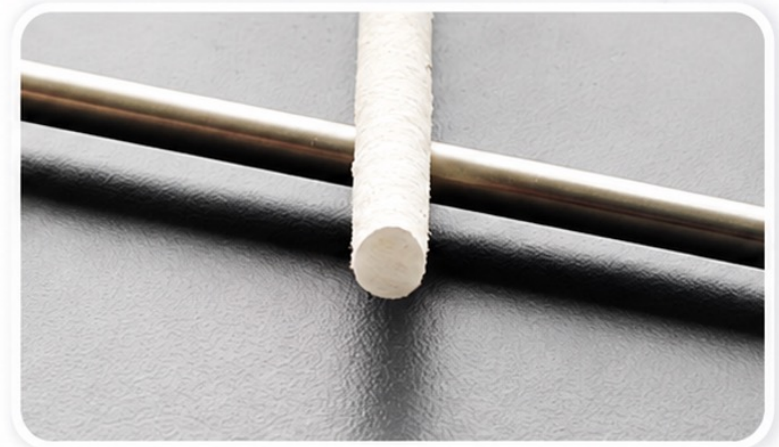
Collector geometry can be customized to sample dimensions



Rotating Mandrel Collector

Fabricate tubular nanofiber structures

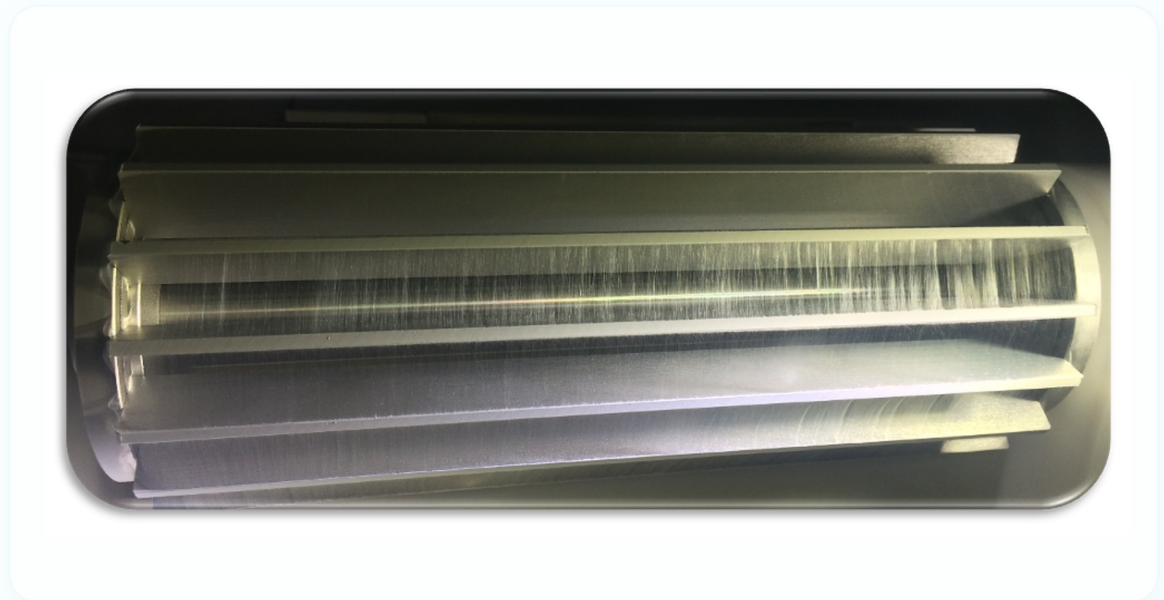
- ! Mandrel diameter: $\varnothing 1\text{--}30\text{ mm}$; wall thicknesses up to several millimeters
- ! Fiber diameter: $100\text{ nm--}3\text{ }\mu\text{m}$
- ! Interchangeable mandrel lengths and sizes
- ! For vascular grafts, conduits and other tubular scaffolds



Rotating Parallel-Electrode Cage Collector

Low-speed collection of aligned fibers

- 01 Custom parallel-electrode cage**
Electrode count, spacing and dimensions tailored to the experiment.
- 02 Approximately 1–150 rpm**
Stable low-speed rotation for aligned-fiber fabrication.
- 03 Porous, aligned fiber layers**
Controls fiber orientation and porosity to improve material properties.
- 04 Thick mats that unfold flat**
Collect large-area, thick fiber membranes for subsequent use.



Coordinated X–Y Motion System

High-precision Y-axis motion with coordinated control and two-dimensional trajectory planning.

01 | Large collection area and payload

Collection area: up to 300×300 mm
Maximum load: 20 kg

02 | Versatile substrate handling

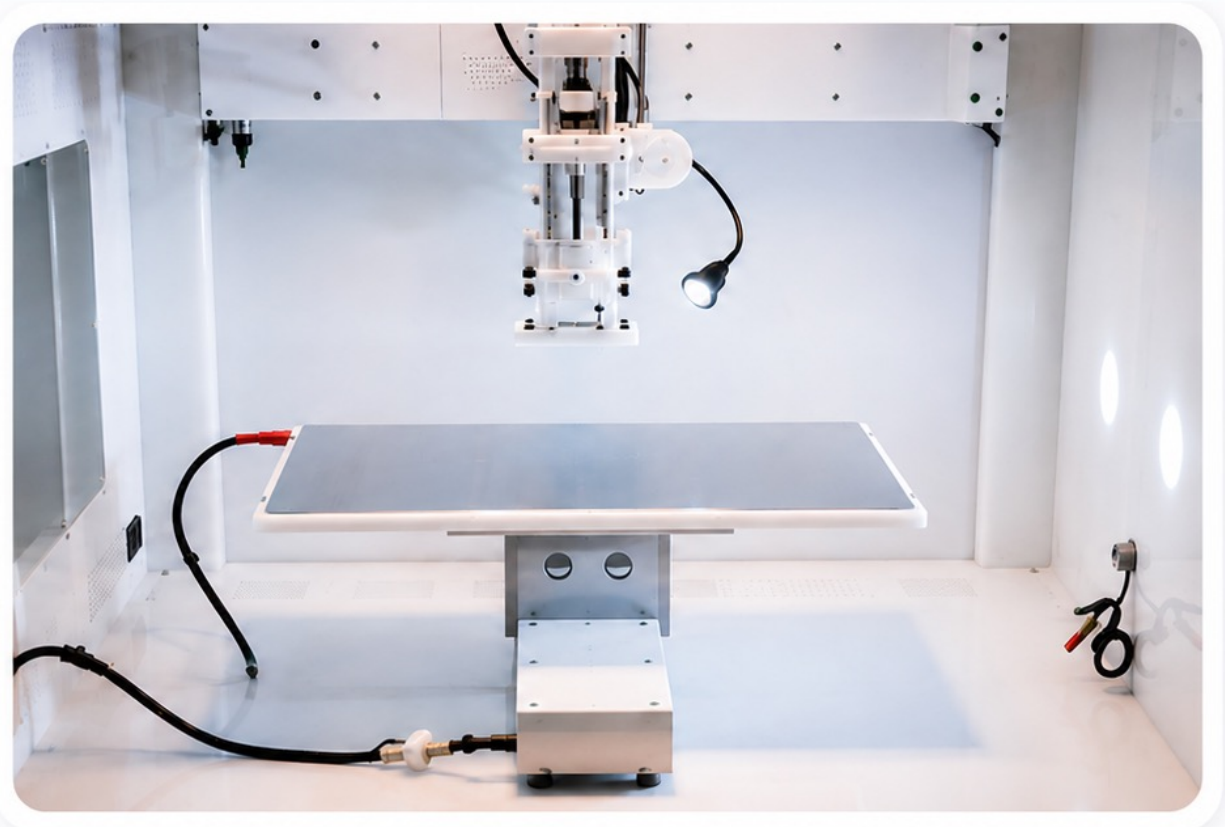
Deposits nanofibers or nanoparticles on non-planar substrates.

03 | High positioning precision

Positioning repeatability: $<50 \mu\text{m}$

04 | Program and CAD import

Supports CAD patterns and program import.
Operating speed: 0–40 mm/s



Accessories & Specialized Process Modules

01

Rotating vacuum chuck

02

Heated spinneret

03

UV curing lamp

04

Microscope imaging system

05

Ionizing air blower

06

Spiral collector

07

Nanoparticle / microsphere collection

08

Orthogonal fiber deposition

09

Centrifugal electrospinning

10

Gas-assisted electrospinning

11

Continuous roll-to-roll collector

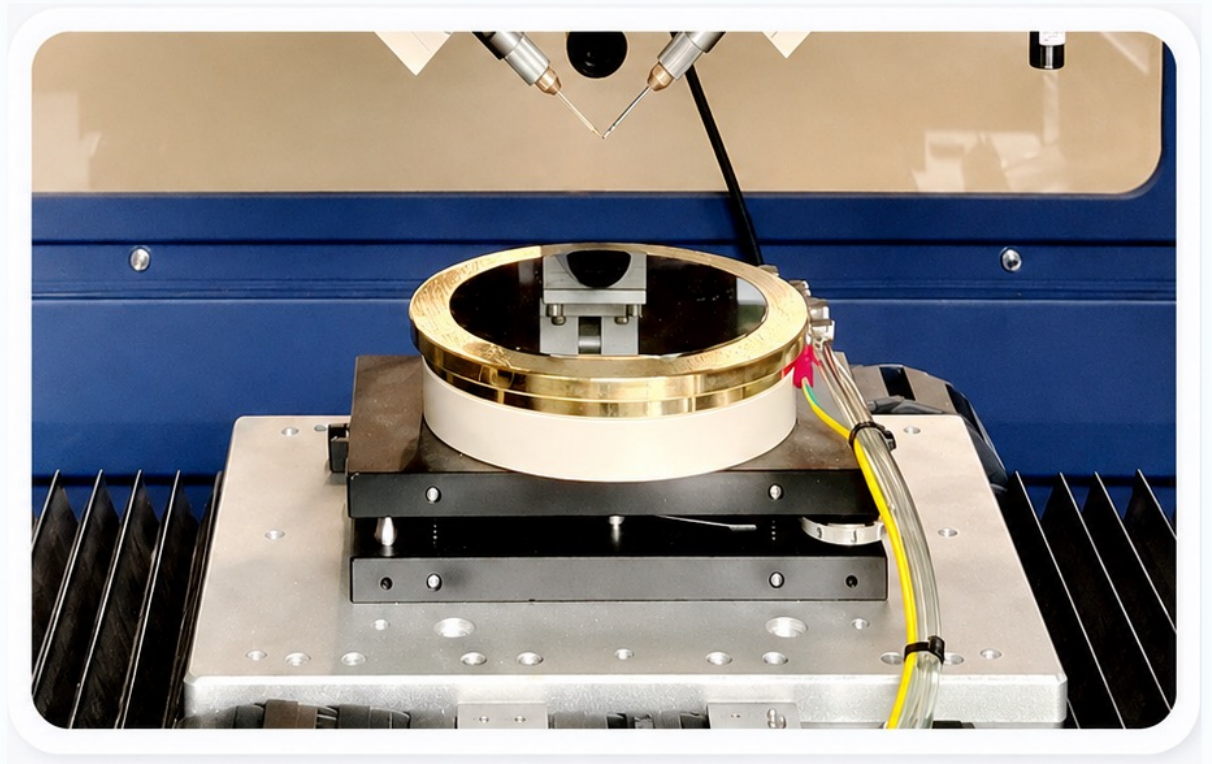
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Custom process modules

Rotating Vacuum Chuck

Securely hold wafers and flat substrates

- 01 | Compatible with wafers, glass, PET, PI and metal foils
- 02 | Dual vacuum channels with independently adjustable holding force
- 03 | Fine leveling and adjustable rotational speed
- 04 | For 1–6 inch wafers and flat substrates

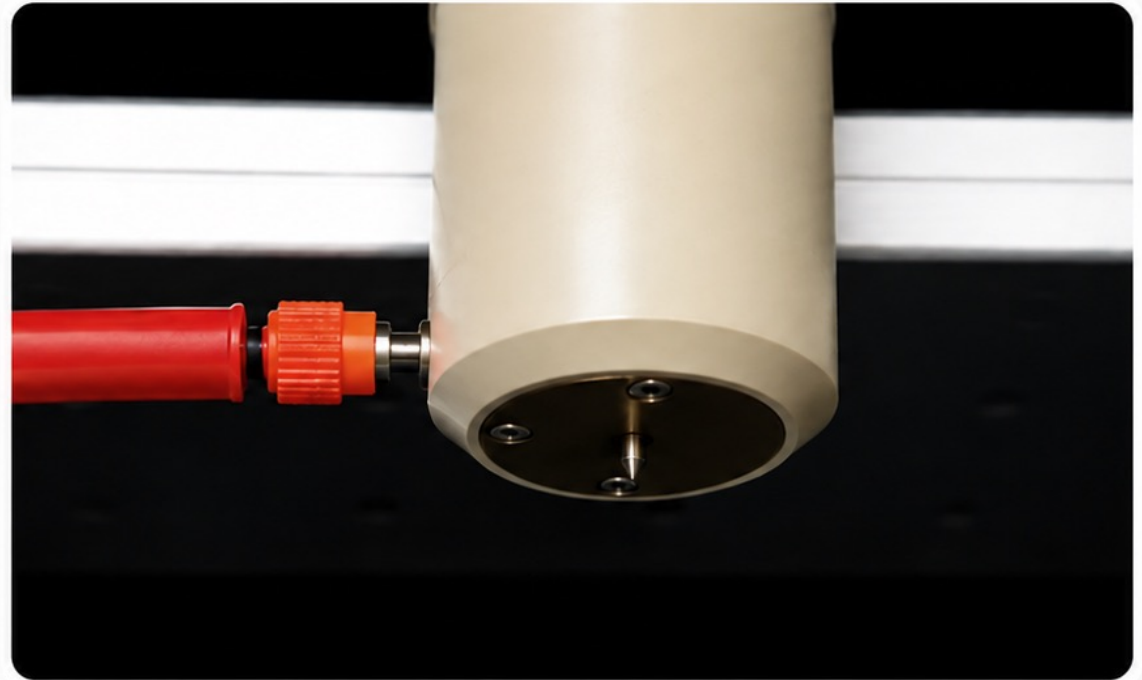


Secure holding | Precision adjustment | Independent control | Versatile substrates

Heated Spinneret

For heated electrospinning and micro/nanoscale direct writing

- 01** | **Ambient to 150°C**
Stable heating for elevated-temperature processes.
- 02** | **Positive high voltage ≤ 25 kV**
Compatible with electrospinning and micro/nanoscale direct writing.
- 03** | **For 5 mL glass syringes**
Standard interface simplifies installation.
- 04** | **Thermally assisted processing**
For thermally assisted electrospinning and direct writing of low-melting-point materials. Heating lowers solution viscosity and stabilizes deposition.



Heated Spinneret

Stable heating · HV compatibility · Precise fit · Thermally assisted direct writing

Spiral Nanofiber Yarn Collector

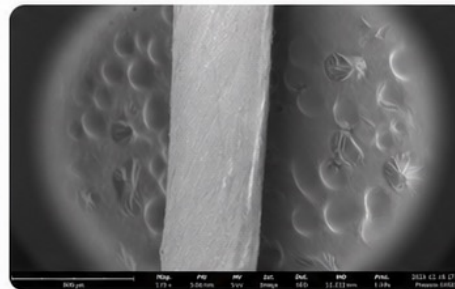
Continuous production of core and coreless nanofiber yarns

Spiral drawing provides stable traction and brings fibers together with controlled alignment.

Interchangeable core materials support different applications.

Efficient deposition creates uniform, porous 3D fiber mats.

Adjust deposition time to control mat thickness with a stable process.



Fiber Microstructure

Uniform, continuous fibers with smooth surfaces support material performance and stability.

Spiral Thick-Mat Collector

Build thick, porous 3D structures beyond conventional thin membranes

01

Continuous 3D mat buildup

Continuous spinning and deposition create three-dimensional fiber mats with substantial thickness.

02

Thickness controlled by run time

Adjust spinning time and process settings to obtain different mat thicknesses.

03

Porous, interconnected fiber networks

Maintains a continuous three-dimensional fiber network as the material builds up.

04

Functional materials research

For solid-state battery electrode materials, filtration, adsorption and tissue-engineering scaffolds.



Thick Three-Dimensional Fiber Mats



Continuous



3D porosity



Thick mats



Multi-material

Applications

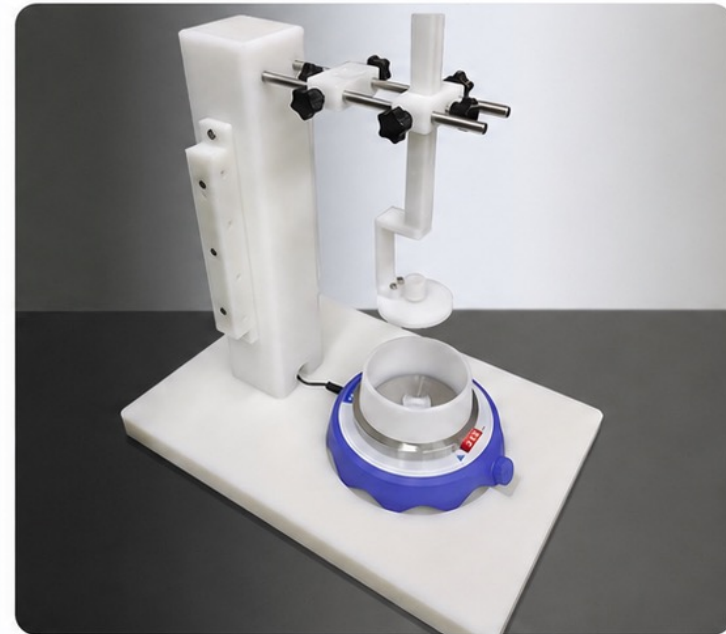
Battery electrode materials
Filtration / adsorption
Tissue scaffolds



Nanoparticle / Microsphere Collection

Reliable collection of nano/microspheres and short fibers

- 01** | Magnetic stirring with liquid-bath collection
- 02** | Reduces particle agglomeration and improves collection uniformity
- 03** | Supports different collection baths and auxiliary electrode arrangements
- 04** | Bath dimensions can be customized for the sample and process



Magnetically Stirred Collection Bath

Less agglomeration · Uniform collection
Custom bath dimensions



Microfilament Nanofiber Coating System

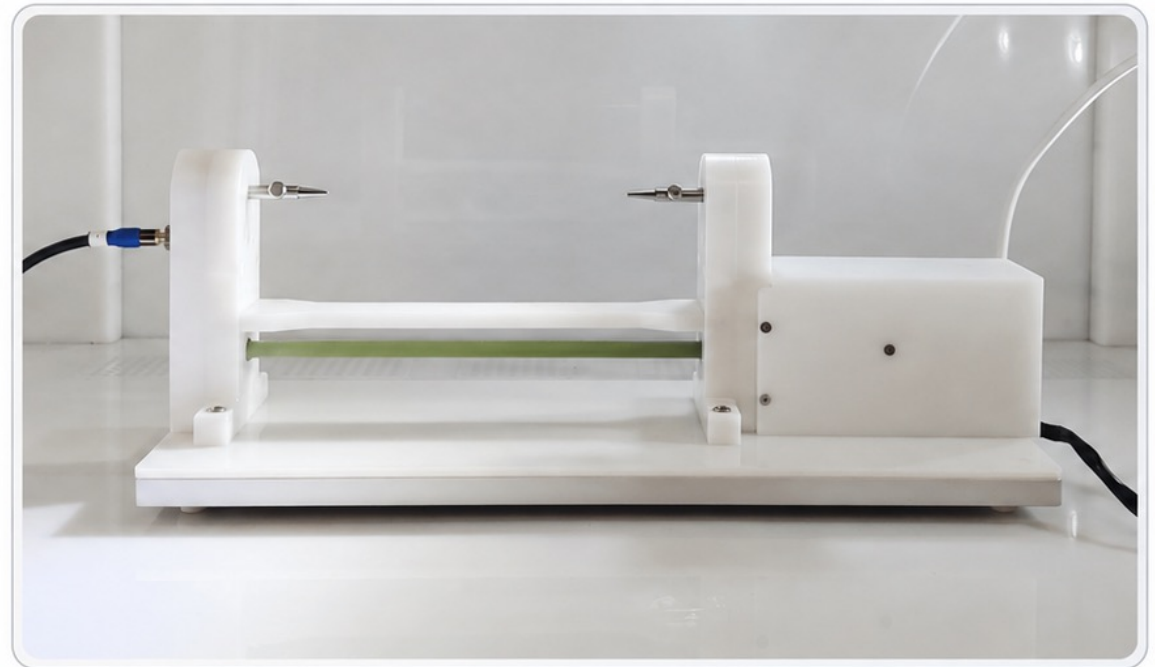
Build nanofiber coatings on fine filaments

- Dual-motor drive maintains stable filament rotation

- Suitable filament diameter: approximately 10–1000 μm

- Rotational speed: approximately 1–5000 rpm

- Deposits a uniform nanofiber layer on microfilament surfaces



Gas-Assisted Electrospinning

Airflow and electrostatic forces improve fiber formation



Output can be substantially higher than conventional electrospinning



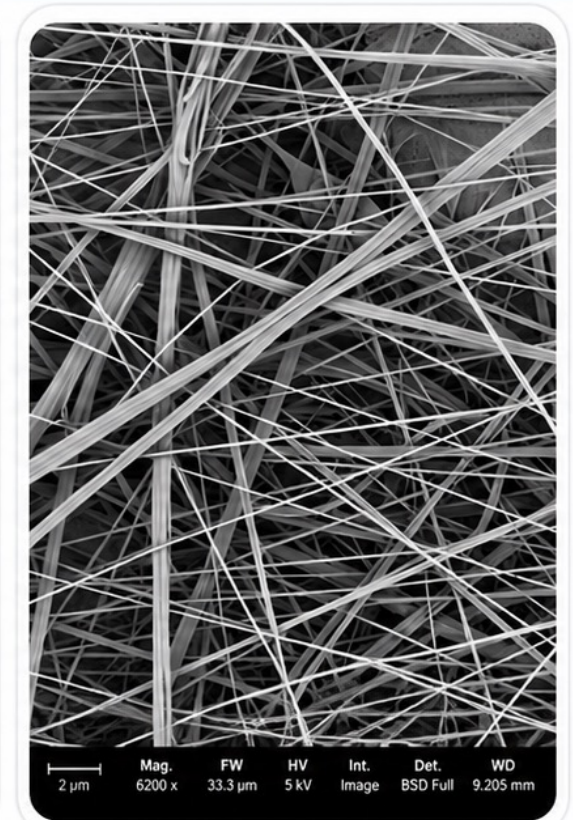
Produces highly lofted fiber mats



Supports cotton-like 3D fiber structures and short nanofibers



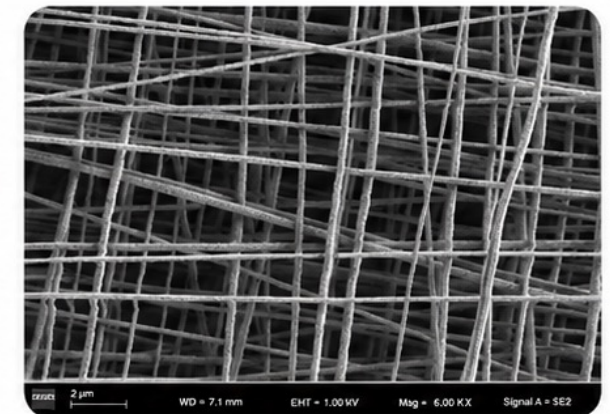
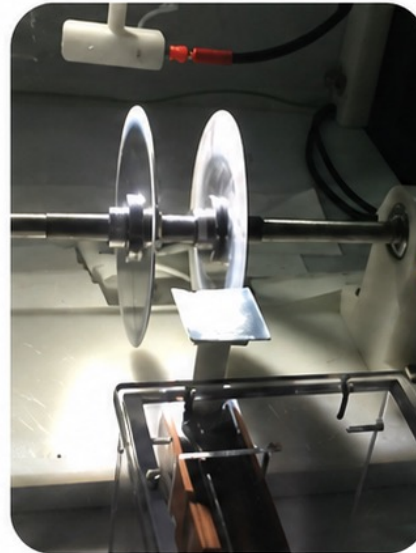
Compatible with polymer solutions and diverse polymer systems



Orthogonal Fiber Deposition System

Alternating $0^\circ / 90^\circ$ layers for ordered fiber architectures

- Produces unidirectional or cross-aligned multilayer fiber membranes
- Synchronized collection on two discs enables repeatable orthogonal deposition
- Adjustable layer count, orientation and fiber spacing
- For tissue engineering and composite reinforcement



Continuous Roll-to-Roll Collector

Continuous fabrication and collection of nanofiber membranes



Collection width:
approximately 250–500 mm



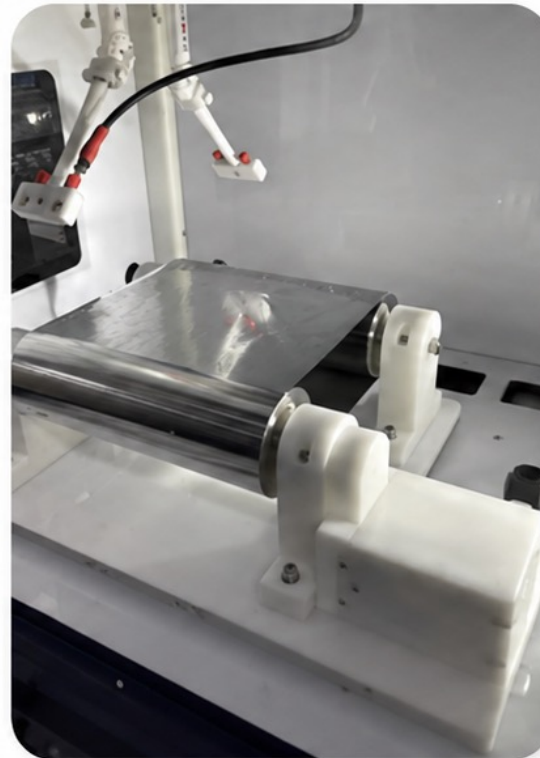
Continuous production length:
approximately 50–100 m



Winding speed:
approximately 1–40 mm/s



Stable tension, preset-length
winding and automated continuous
production



UV Curing Lamp

In-situ curing without transferring the sample



In-process UV curing



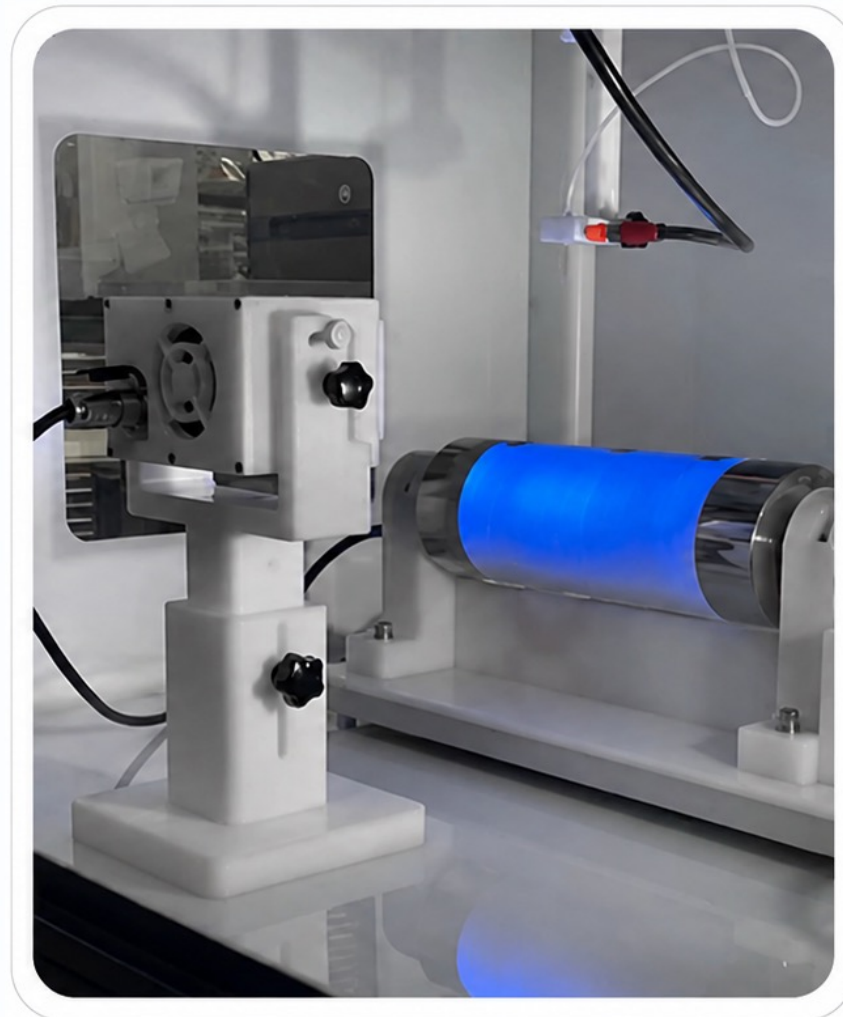
Reduces sample transfers and processing steps



Uniform illumination for rapid curing



Easy integration with electrospinning and micro/nanoscale direct-writing platforms



Centrifugal Electrospinning

Centrifugal force and an electric field for high-throughput fiber formation



Improves fiber formation efficiency and stability



Suitable for polymer solutions and melts



High-rate production of nanofiber membranes



Spinning disc diameter: approximately 650 mm



Rotating Flat-Plate Collector

High-speed rotation for large-area aligned fiber membranes



Servo drive with stepless speed adjustment: approximately 1–5000 rpm



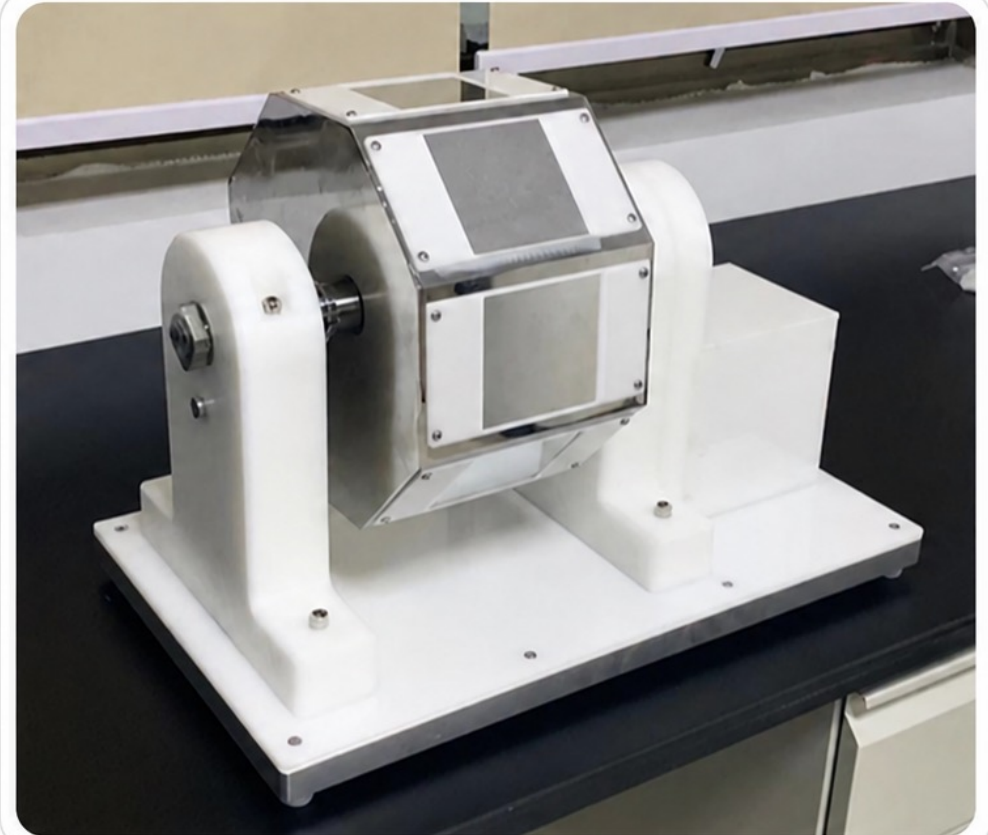
Improves consistency of fiber alignment



Supports random, partially aligned and highly aligned structures



Standard plate: approximately 80 × 80 × 0.5 mm



Microscope Imaging System

Observe droplets and jet formation in real time



High-resolution microscope and industrial camera



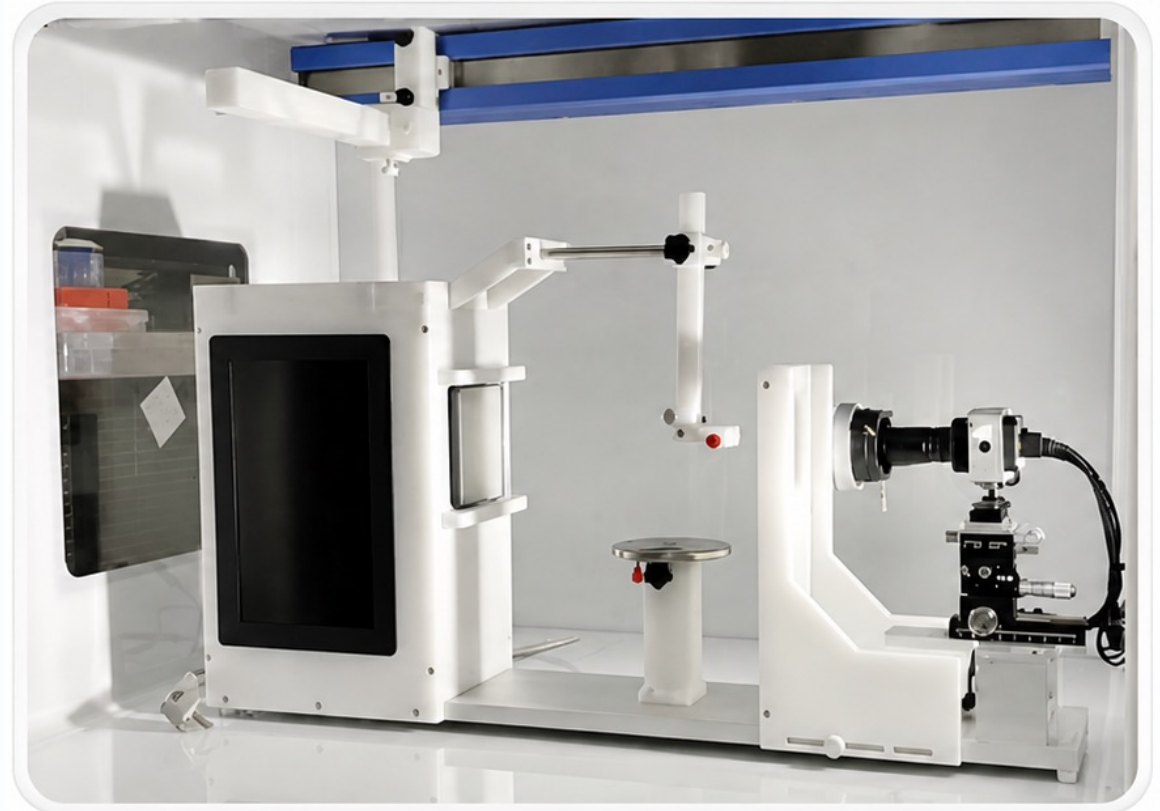
Real-time observation of droplets, jets and the Taylor cone



Stable relative positioning of the camera and needle



Visual evidence for process optimization and stable production



Ionizing Air Blower

Neutralize accumulated charge and improve fiber deposition



Reduces fiber adhesion and flyaway fibers



Improves membrane uniformity and consistency



Reduces bead defects and improves fiber morphology



Promotes solvent evaporation and improves experimental safety



Safety Features

Multiple safeguards for personnel and equipment



Emergency stop: rapid shutdown in an emergency



Automatic power cutoff for overvoltage or overcurrent



Door interlock: high voltage switches off when the door opens



Multi-point grounding of the enclosure, syringe pumps and collectors



Biomedical Electrospinning Platform

Designed for reliable, repeatable and traceable biomedical nanofiber fabrication.

GMP-Ready Design

Clean construction for biomedical R&D and manufacturing.

Stable High Voltage

Closed-loop feedback provides stable, reliable output.

Uniform Electric Field

Optimized field design improves fiber uniformity.

Modular Processing

Rapid changeover of spinnerets and collector modules.

Digital Manufacturing

Process-wide parameter logging and data traceability.

Electrical Safety

Grounding, insulation and interlocks support safe high-voltage operation.



Biomedical Electrospinning Platform Every system is built around its application.

◆ Material

Optimize process settings and equipment for each material system.



◆ Process

Tailor equipment and workflow to the selected process route.



◆ Spinneret

Combine single, multi-channel, coaxial and array spinnerets to achieve the required fiber morphology.



◆ Collector

Flat sheets, tubes, nanofiber yarns and three-dimensional fiber structures.



◆ Environment

Configure temperature, humidity, cleanliness and exhaust to maintain a stable spinning environment.



◆ Automation

Process control, centralized data management and line automation increase efficiency and reduce manual intervention.



“
**Tailored to
Your Application**
”

The platform is designed around your process.

Selected Installations | Trusted by 1,000+ Universities and Manufacturers Worldwide



Dalian University of Technology



Shandong Second Medical University



Medical company, Shenzhen



Regenerative medicine company,
Guangdong



Medical company, Ningbo



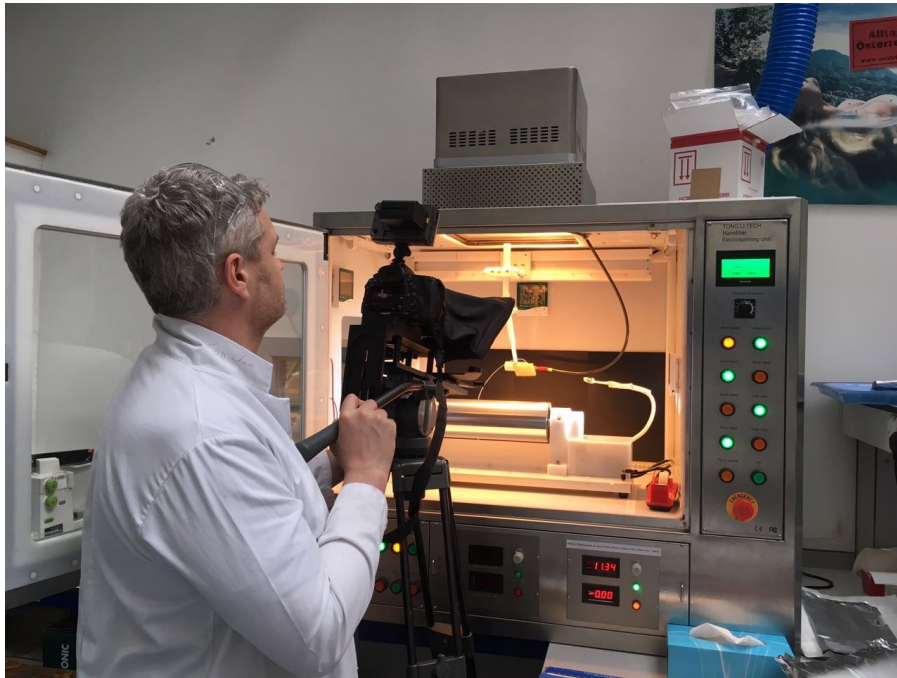
Regenerative medicine company,
Guangdong



Medical company, Shanghai
(Separate-unit system)



Medical company, Suzhou



The University of Manchester



Chongqing Institute of Biomanufacturing



Medical company, Beijing



Duke University



Medical company, Shenyang



Duke University



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SHENZHEN TONGLI TECH CO LTD

WhatsApp: +852-65920586

WeChat: TONGLITECH

Tel: +86-18620351601

www.electro-spinning.com