



Flagship All-in-One Platform

TL-OMNI

All-in-One

High-Voltage Electrospinning Platform

A modular platform for R&D, process validation
and pilot-scale production

General Laboratory / Biomedical Cleanroom / Custom Process Configurations

SHENZHEN TONGLI TECH CO LTD.



www.electro-spinning.com · +86-18620351601

General Laboratory Platform

For research, process validation and small-batch production

TL-OMNI

- 01 Powder-Coated Enclosure**
Dark-blue industrial finish for general research laboratories.
- 02 Versatile Process Options**
Compatible with a wide range of spinnerets, collectors and process modules.
- 03 Diverse Fiber Architectures**
Flat membranes up to 500 mm wide, tubular membranes and 3D fibrous structures.
- 04 Open Modular Architecture**
Expandable capabilities to meet evolving research requirements.



Biomedical Cleanroom Platform

For GMP manufacturing environments and implantable materials

TL-OMNI-BM

- 01 Stainless-Steel Construction**
Cleanroom design for biomedical manufacturing environments.
- 02 Implant Manufacturing Validation**
Proven in production validation for a range of implantable medical products.
- 03 Process Customization**
Supports automation and production-line integration.
- 04 Modular Process Expansion**
A broad choice of spinnerets, collectors and dedicated process modules.



Integrated Materials and Process Development

TL-OMNI · Stable, reliable and reproducible

One Platform

Expanding Research Capabilities

Materials and structures
Process validation and scale-up

01

R&D to Pilot Production

Supports research,
process validation
and pilot-scale production.

02

Interchangeable Modules

Flexible combinations
of spinnerets, collectors
and process modules.

03

Clean, Stable Processing

A clean enclosure and reduced
electric-field interference
support stable spinning.

04

Reproducible Processes

Three-axis motion, environmental
control and digital recipes
support reproducibility.

TL-OMNI Configuration Overview

Six integrated modules for electrospinning research and process development

Standard: powder-coated enclosure | BM: SS304 / 316 cleanroom construction

01 High Voltage and Control

±30 kV bipolar high-voltage supplies
Programmable settings; touchscreen and buttons
Recipe recall; data logging, storage and export

02 Precision Fluid Delivery

2-channel syringe pump + 4-channel high-capacity pump
0.02–99.99 mL/h
Resolution: 0.01 mL/h; maximum thrust: 353 N

03 Versatile Spinneret Platform

Coaxial, triaxial, sea-island and side-by-side spinnerets
Near-field / melt electrowriting; V-array; air-assisted spinning
600 mm scanning travel; optional automatic cleaning

04 Versatile Fiber Collection

Flat / tubular membranes, aligned fibers and 3D structures
300 × 300 mm X-Y stage
500 mm wide drum; speeds up to 5000 rpm

05 Environment and Safety

Integrated temperature, humidity, lighting, UV and exhaust control
Ambient–45°C; humidity: 20%–70% RH
150 m³/h exhaust; door interlock; E-stop; multi-point grounding

06 Modular Expansion

Dedicated processes and future capability upgrades
50 kV supplies; roll-to-roll; heated chamber; nanofiber yarn
Liquid bath, magnetic field, cooling stage and in situ microscopy

1500 × 850 × 1740.74 mm (W × D × H) · 220 V / 50 Hz · Rated power: 1 kW · No water connection required · 3-year warranty

Bipolar High-Voltage Supplies

Stable high-voltage output for reproducible electrospinning

$\pm 30-50$ kV

Bipolar high-voltage configurations



Stable output / Multiple protection functions

- 01 Coordinated Bipolar Control**
Flexible polarity selection for different processes.
- 02 Multiple HV Outputs**
One negative supply with multiple positive supplies.
- 03 Stable Output and Compensation**
Real-time voltage monitoring maintains stable output.
- 04 Comprehensive Protection**
Overvoltage, overcurrent, arcing and short-circuit protection.
- 05 Industrial-Grade Insulation**
Safe, convenient operation via touchscreen and buttons.

Intelligent Control System

Digital control throughout the electrospinning process

01

Centralized Parameter Control

Set high voltage, flow, motion and environmental parameters in one interface.

02

Adjustment During Operation

Change parameters during a run to respond to experimental requirements.

03

Touchscreen and Button Control

Intuitive, convenient and reliable operation.

04

Recipes and Experiment Logs

Save and recall recipes with traceable data for reproducible processes.

Control functions can expand with the equipment configuration.



Multi-Channel Servo Syringe Pump

Precision fluid delivery for stable electrospinning

01

Independent Channel Programming

Independent control of each channel, with expansion on request.

02

Servo Motor Drive

Precise, continuous and stable fluid delivery.

03

High Thrust

Suitable for high-viscosity fluids.

04

High-Voltage Insulation

Electrical isolation for electrospinning operation.



Standalone High-Capacity Syringe Pump

Precise delivery for stable, controlled electrospinning

- 01 Extended Continuous Delivery**
For pilot trials, scale-up and long-duration operation.
- 02 Coordinated Multi-Channel Delivery**
Stable, consistent flow supports higher overall throughput.
- 03 Separate Unit with Tubing Connection**
Flexible installation for different equipment and laboratory layouts.
- 04 Process Integration**
Works with multi-spinneret systems and continuous collection modules.

Optional configurations for specific processes and throughput requirements.



Humidity Control System

Process control range: 20–80% RH

- 01 Standard Dehumidification**
Reduces humidity to approximately 30% RH at room temperature.
- 02 Enhanced Dehumidification**
Reduces humidity to approximately 20% RH at room temperature.
- 03 Mist-Free Humidification**
Reduces mist deposition and localized humidity variations.
- 04 Selectable Operating Modes**
Both units can be installed, but only one operates at a time.



Dust-Free Heating System

A stable, clean and controllable thermal environment

01 Continuous Temperature Adjustment

Room temperature to approximately 45°C.

02 External Heat Source

Preserves the electric-field distribution inside the chamber.

03 Uniform Heating

Even heating across a large working area.

04 Multi-Zone Temperature Control

Expandable temperature control for spinnerets, collectors and other zones.



Rotary Collector Heating System

Independent heating for low-volatility solvents and elevated-temperature collection

Optional module

Mandrel Heating

Maximum temperature: approximately 60°C.

Drum Heating

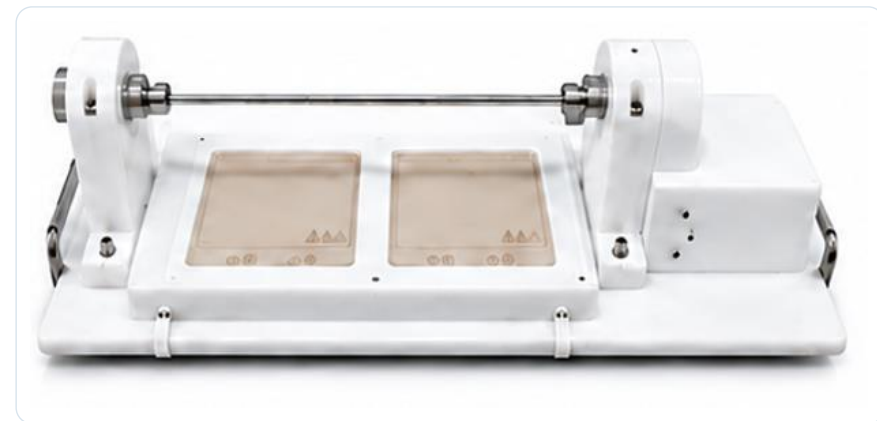
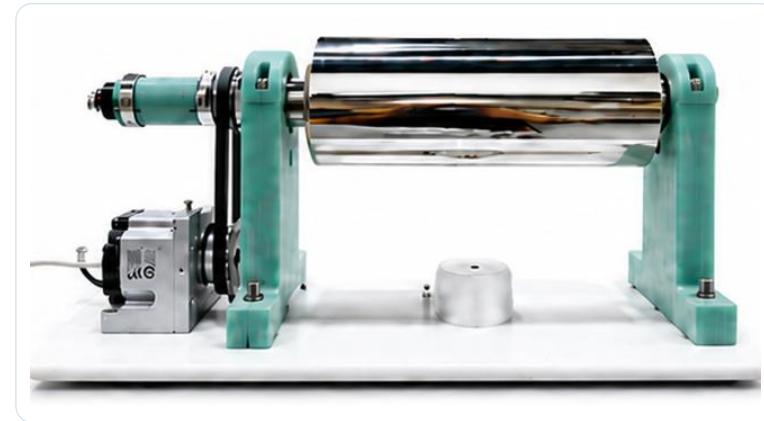
Maximum temperature: approximately 140°C.

Independent Control

Heat the mandrel and drum independently to suit the process.

Thermally Assisted Spinning

For specialty materials and thermally assisted electrospinning.



Versatile Spinneret Platform

Standard and optional modules for different materials and process requirements

01

Parallel / Side-by-Side

Dual parallel spinnerets
with direct pump connection
Side-by-side and rotatable
side-by-side spinnerets

02

Coaxial / Triaxial

5 coaxial needle pairs;
5 triaxial needle sets
For multilayer fiber structures

03

Multi-Channel Sea-Island

Two- and three-channel
sea-island spinnerets
For multicomponent composite fibers

04

Near-Field / Melt Electrowriting

Solution near-field writing;
melt electrowriting up to 150°C
For lines and patterned structures

05

Multi-Needle / Multi-Spinneret

V-array with 8–12 needles
Linear, annular, array, conjugate
and coaxial configurations

06

Air-Assisted and Specialty

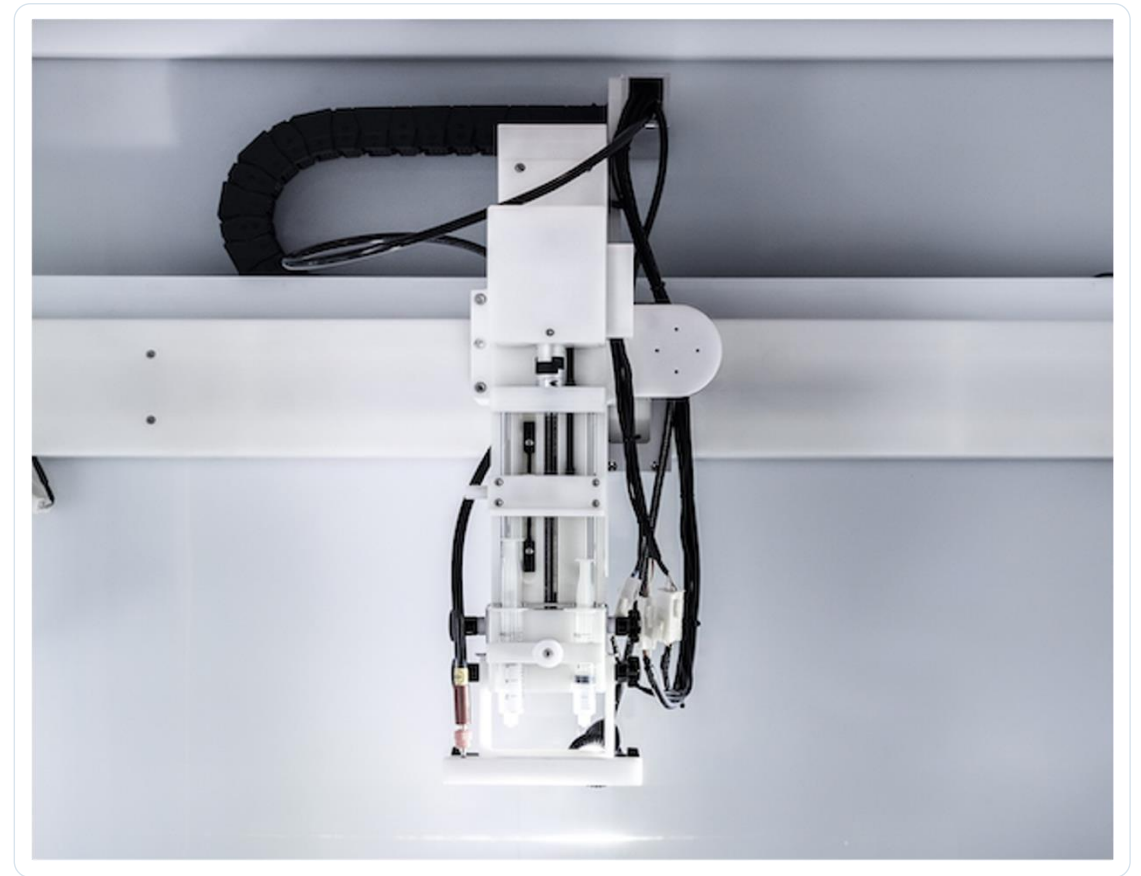
Air-assisted and centrifugal
spinning heads
Ultrasonic heads and other options

Low-volume research, multicomponent fibers, direct writing, small-scale production and air-assisted 3D structures.

Low-Volume Dual Parallel Spinneret

Precision dual-channel electrospinning with minimal sample volume

- 01 Low Sample Consumption**
Start experiments with approximately 0.5 mL of sample.
- 02 Servo Drive**
Stable, precisely controlled flow.
- 03 Direct Syringe-to-Needle Connection**
Reduces tubing volume and solution consumption.
- 04 Precious Samples and Composites**
For small-volume samples and multicomponent materials research.



Glass Micro-Spinneret

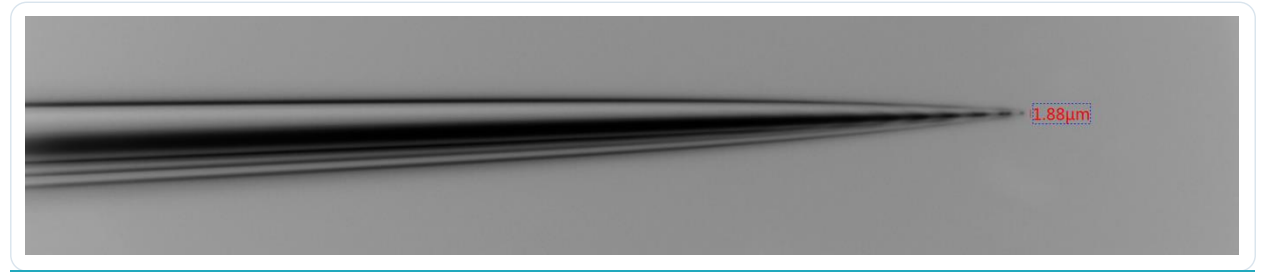
Ultrafine fluid control and micro/nanoscale direct writing

01 Micrometer-Scale Tips
Selectable tip diameters from 1 to 45 μm .

02 Ultrafine Nanofibers
Suitable for fine-fiber fabrication.

03 Micro/Nanoscale Patterning
Supports near-field direct writing and patterned deposition.

04 Small-Volume Experiments
For low-viscosity fluids and small sample volumes.



Coaxial Spinneret

Reproducible fabrication of core-shell fibers

Precision Concentric Design

Concentric inner and outer needles support stable core-shell formation.

Interchangeable Needle Sizes

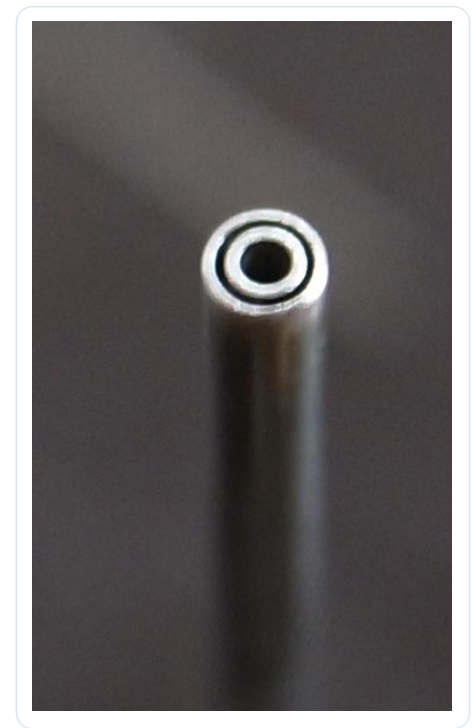
Combine needles of different sizes to suit the process.

Quick Disassembly

Remove and replace inner and outer needles independently.

Air-Assisted Operation

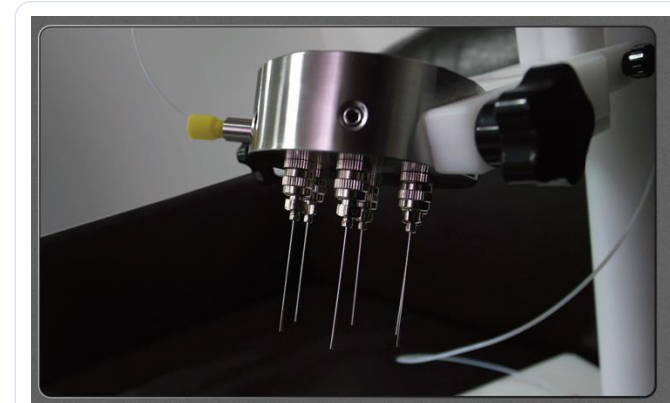
Supports air assistance and a lower onset voltage.



Annular and Array Coaxial Spinnerets

Scale coaxial spinning from a single needle to parallel multi-spinneret operation

- 01 Configured for Throughput**
Choose annular or array configurations.
- 02 Simultaneous Multi-Spinneret Operation**
Increases core-shell fiber production capacity.
- 03 Optimized Spinneret Spacing**
Reduces electric-field interference between jets.
- 04 Continuous Composite Fibers**
For pilot-scale production and continuous processing.



Triaxial Spinneret

Precision fabrication of multilayer composites and nested core-shell fibers

Three Independent Fluid Channels

Supply and combine each component independently.

Precision Concentric Geometry

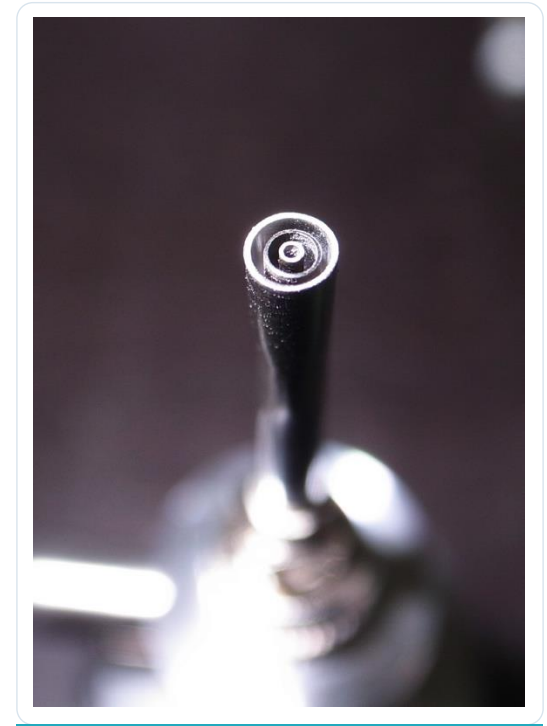
High concentricity supports stable jet formation.

Modular Needles

Flexible combinations of different needle sizes.

Multilayer Functional Fibers

For drug delivery and functional fiber research.



Coaxial and Triaxial Needle Sizes

Common gauges and needle combinations

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 Needle	Middle Needle	Outer Needle
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

V-Array Multi-Needle Spinneret

For experimental research and production scale-up

Simultaneous Multi-Needle Spinning

Supports simultaneous operation of 2N needles.

V-Shaped Arrangement

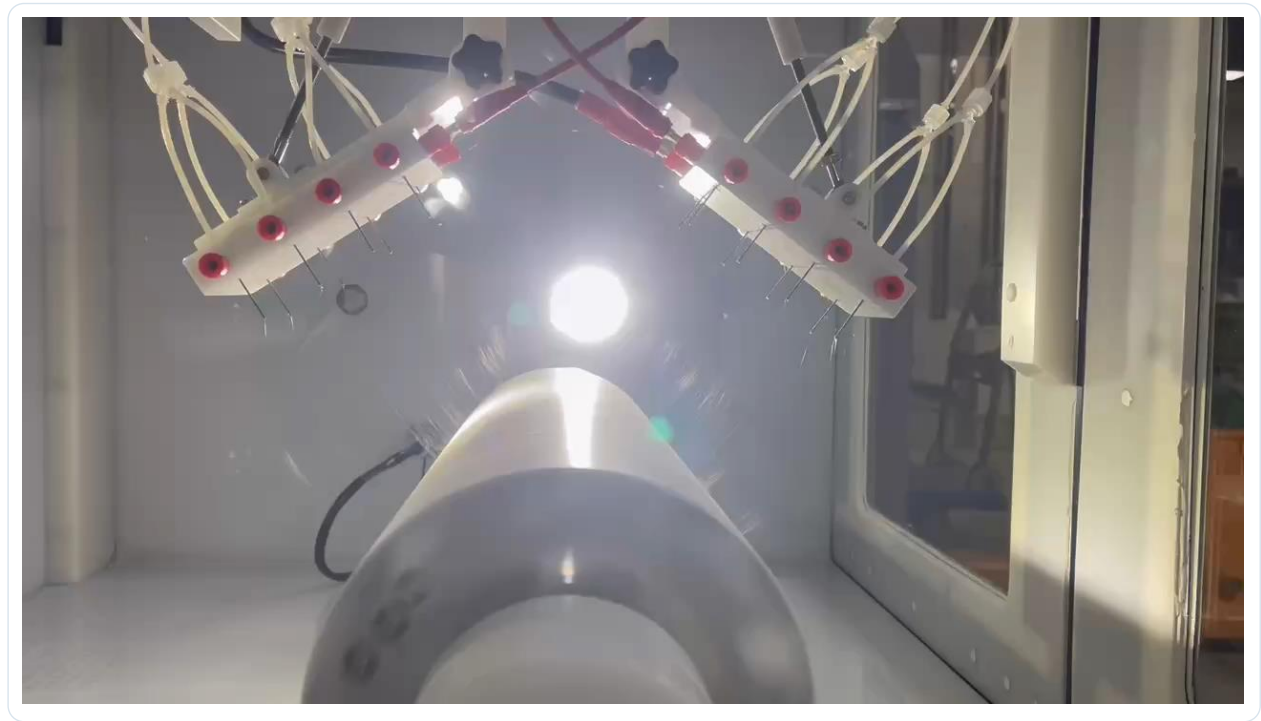
Improves membrane uniformity.

Adjustable Angle and Spacing

Precise adjustment of spinneret geometry.

Combined Process Modes

Supports conjugate spinning and combined electrospraying / electrospinning.



Independent positive high-voltage settings on each side.

Conjugate Spinneret

Coordinated positive and negative polarities for specialty fiber structures

Coordinated Bipolar Spinning

Electrospinning with positive and negative high voltages.

Reduced Charge Accumulation

Improves fiber-layer uniformity.

Simultaneous Dual-Material Spinning

Processes two materials simultaneously.

Reduced Jet Interference

Improves process stability.



Multi-Channel Sea-Island Spinneret

Complex cross-sections and multicomponent functional fibers

Multi-Channel Sea-Island Design

Two- and three-channel configurations.

Simultaneous Multi-Material Spinning

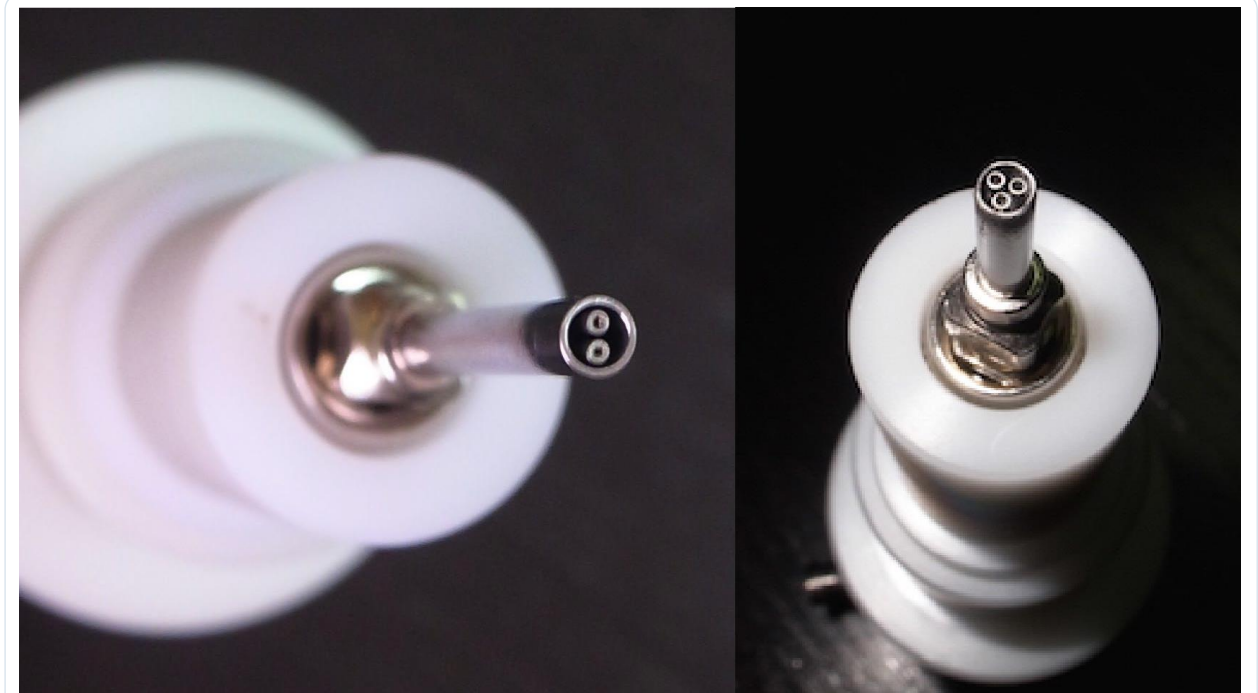
Processes three or more materials simultaneously.

Specialty Fiber Cross-Sections

Produces sea-island, cable-like and other structures.

Independent Material Supply

Configure and supply each channel independently.



Side-by-Side Spinneret

Independent fluid feeds for bicomponent composite fibers

01

Independent Flow Control

Adjust the flow rate of each channel independently.

02

Simultaneous Dual-Material Spinning

Stable, simultaneous electrospinning of two materials.

03

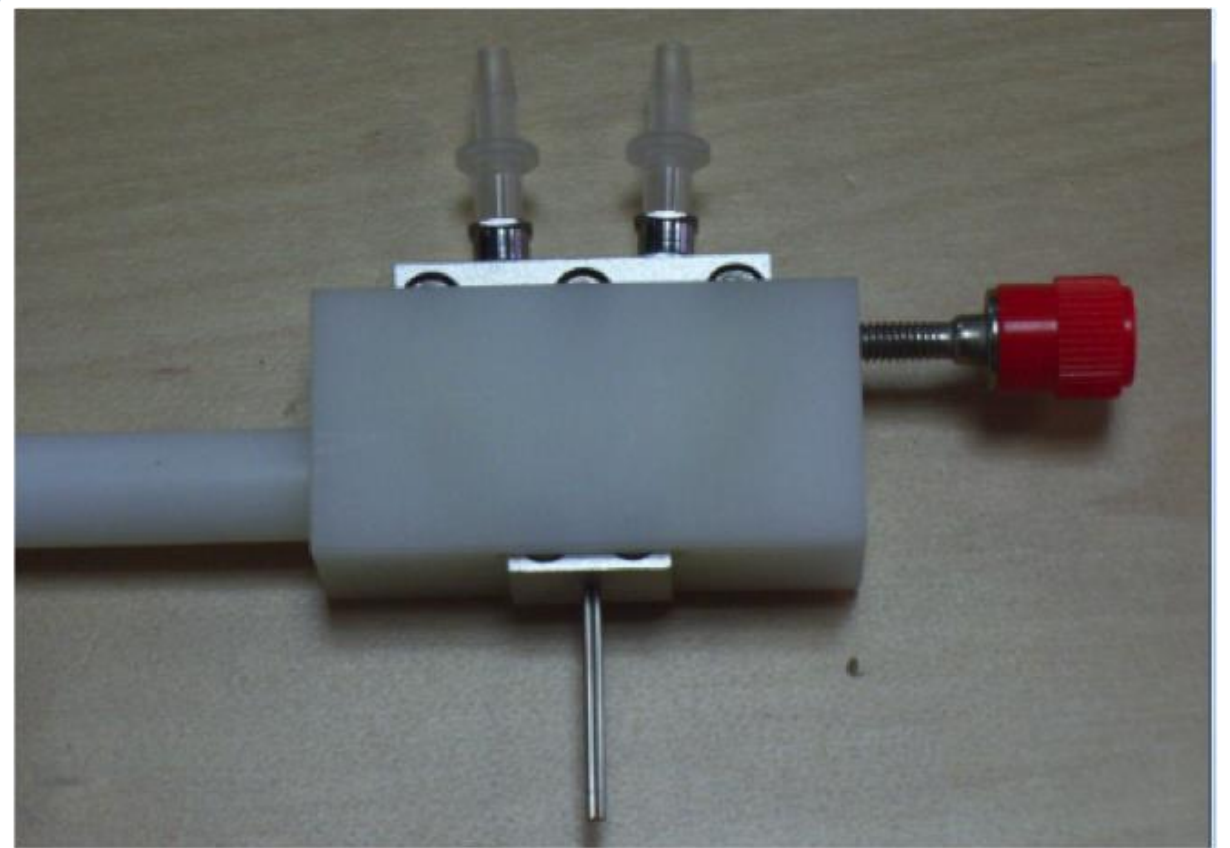
Multiple Needle Sizes

Supports different needle and material combinations.

04

Functional Composite Fibers

For Janus, self-crimping and other fiber architectures.



Linear, Annular and Array Spinnerets

Single-inlet / N-outlet or N-inlet / N-outlet designs for your process and capacity

01

Custom Configurations

Specify the needle count, arrangement and spacing.

02

Stable Parallel Spinning

Simultaneous multi-spinneret operation increases throughput.

03

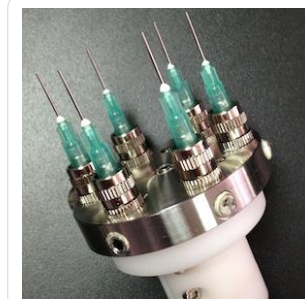
Uniform Fiber Deposition

Optimized spinneret layouts improve membrane uniformity.

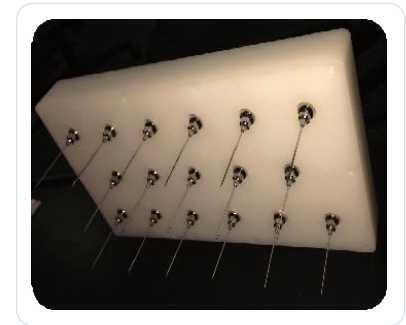
04

Research and Production

For laboratory work, pilot trials and continuous production.



Annular Spinneret

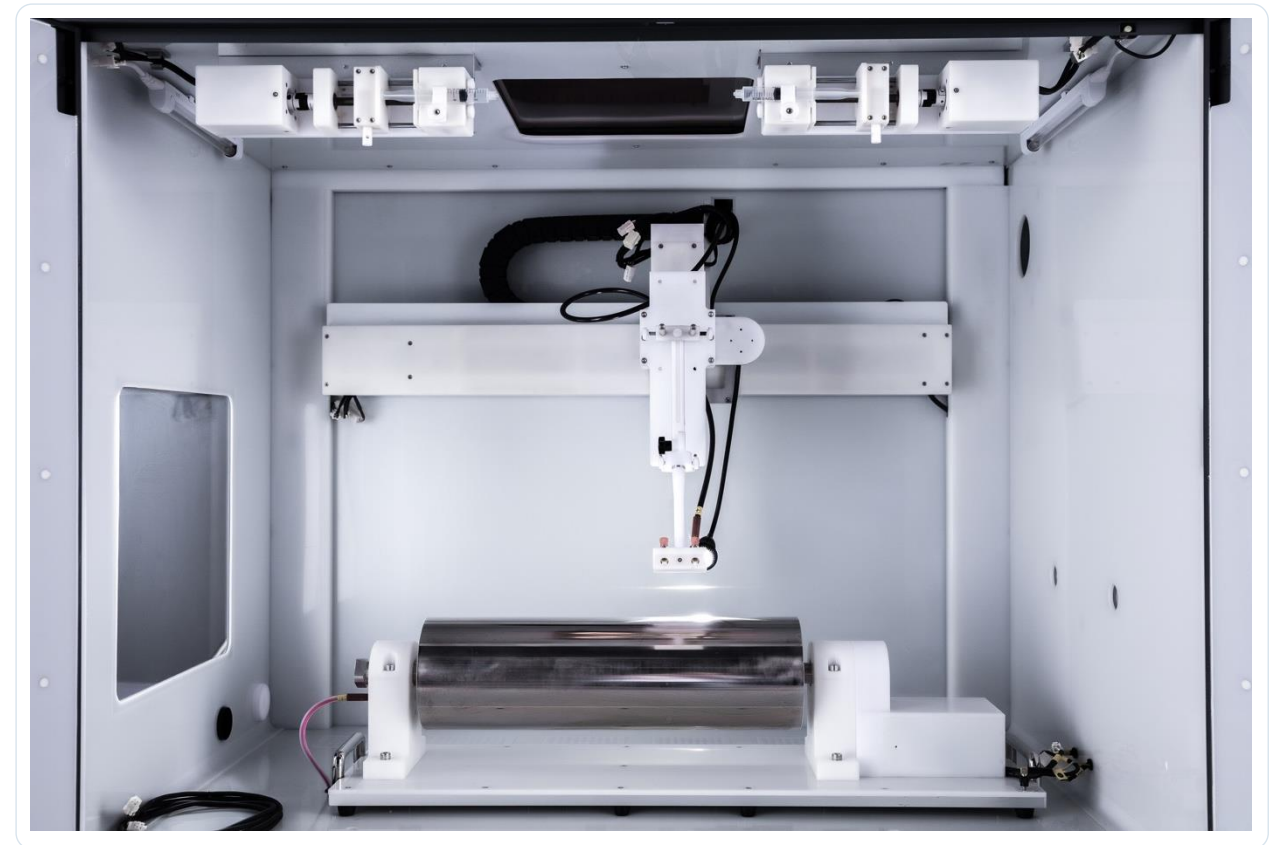


Array Spinneret

Automatic In-Process Needle Cleaning

Reduced clogging for stable, continuous electrospinning

- 01 Cleaning During Operation**
Clean needles without interrupting electrospinning.
- 02 Programmable Cleaning Frequency**
Set the frequency according to solvent volatility.
- 03 Automatic Reciprocating Cleaning**
Reciprocating needle motion with automatic cleaning.
- 04 Volatile Solvent Systems**
Particularly suitable for highly volatile solvents.



Spinneret Motion System

Uniform nanofiber coverage across each deposited layer

01

Precision X-Axis Scanning

Travel: approximately 600 mm.
Speed: 1–40 mm/s.

02

Reproducible Motion Settings

Set acceleration and deceleration, then recall settings via the touchscreen.

03

Precision Z-Axis Positioning

Travel: approximately 200 mm.

04

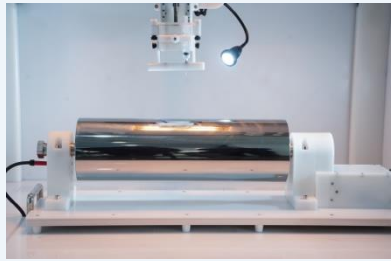
Three-Axis Motion Expansion

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



Nanofiber Collection Systems

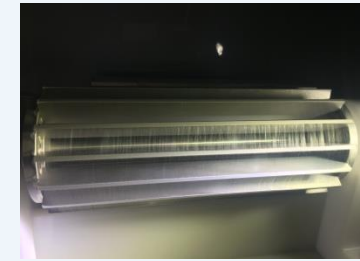
Interchangeable collectors for different fiber architectures



Flat Mats and Aligned Fibers



Tubular Membranes



Porous, Aligned Fiber Layers



Microfilaments and Nanofiber Yarn



Continuous Rolls



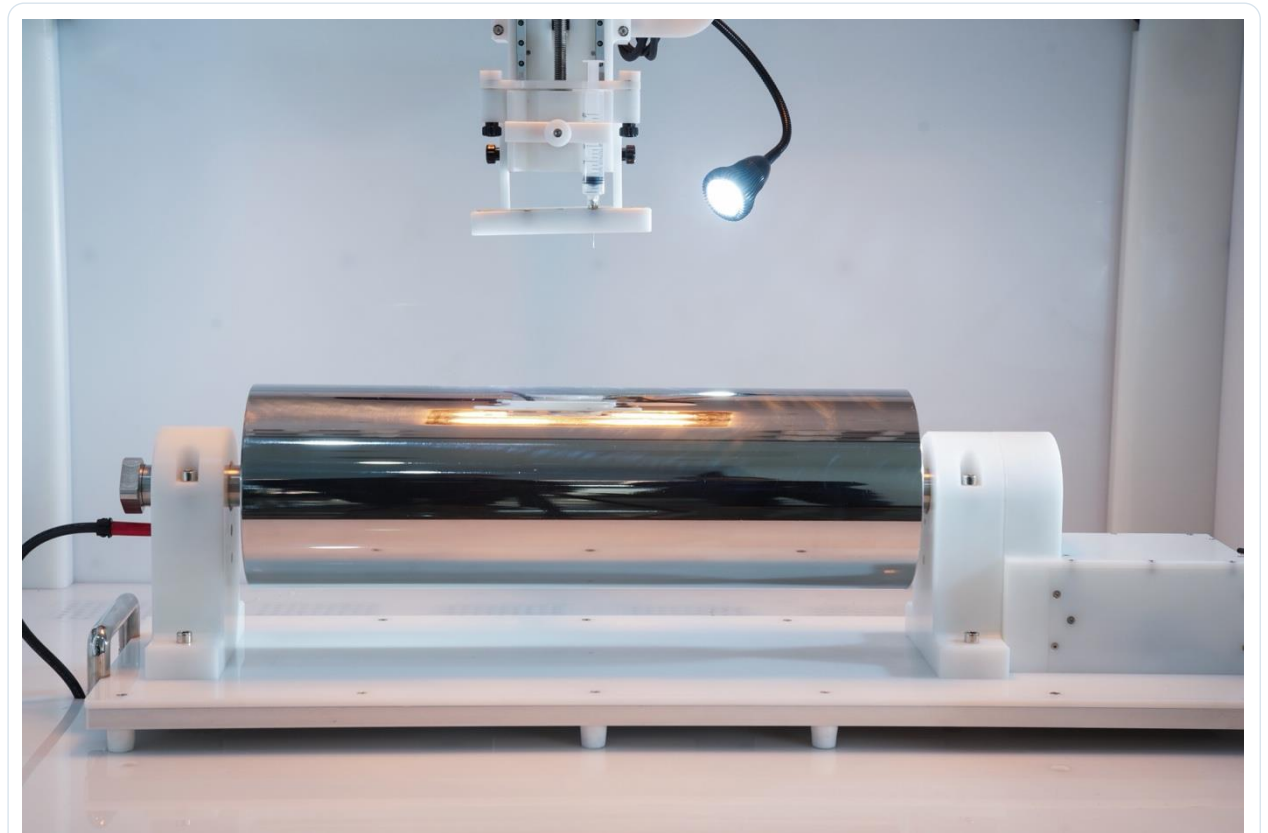
Lofty 3D Fibrous Structures

Flat and tubular membranes, microfilaments, yarn, thick mats, continuous rolls, patterned deposits and multilayer composites.

Large-Area Rotating Drum Collector

Uniform collection of flat and tubular fibrous membranes

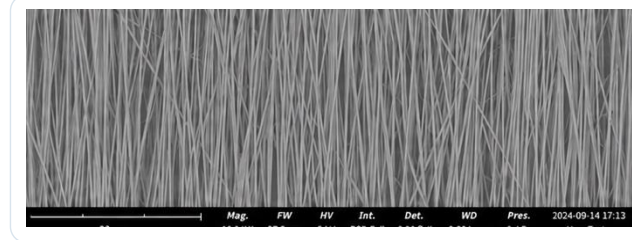
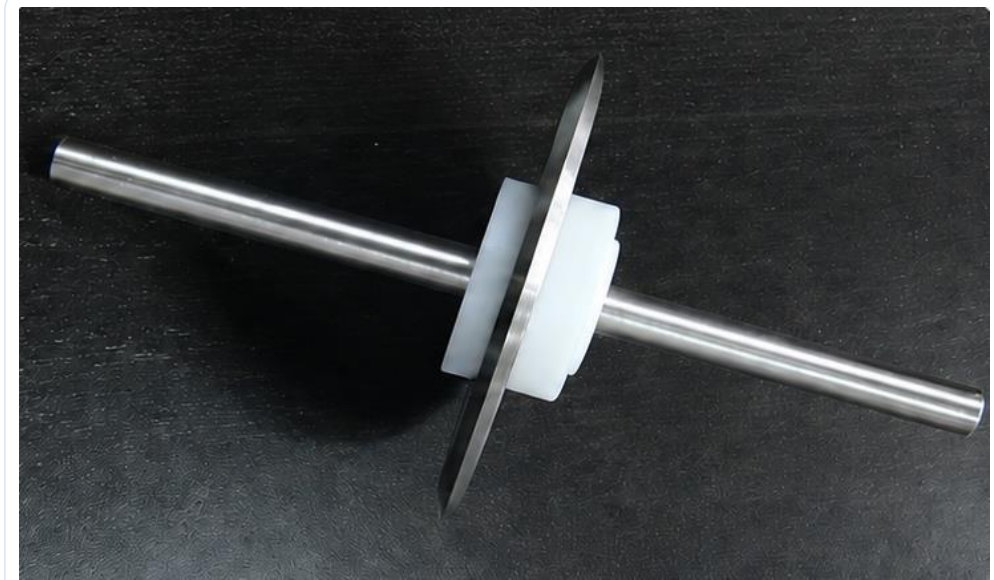
- 01 Drum 1**
Ø159 × 500 mm
Speed: 1–600 rpm (± 1 rpm).
- 02 Drum 2**
Ø100 × 300 mm
Speed: 1–5000 rpm (± 1 rpm).
- 03 Custom Drum Sizes**
Drum dimensions available to suit application requirements.
- 04 Random or Aligned Fibers**
Supports random and aligned fiber deposition.



Rotating Disc Collector

Highly aligned fibers collected along the disc edge

- 01 Rotational Speed**
Approximately 1–5000 rpm.
- 02 Disc Diameter**
Approximately 180 mm.
- 03 Adjustable Fiber Band Width**
Adjust to suit the required fiber band geometry.
- 04 Highly Aligned Narrow Bands**
For narrow bands of highly aligned fibers.



High-Alignment Rotary Collector

High-speed collection for highly aligned fiber structures

- 01 High-Speed Rotation**
Approximately 1–5000 rpm.
- 02 High Fiber Alignment**
High-speed collection promotes aligned deposition.
- 03 Thin Mats and Fiber Bundles**
For highly aligned thin mats and fiber bundles.
- 04 Custom Collector Geometry**
Collector dimensions tailored to the required sample size.



Mandrel Collector

Fabrication of tubular nanofibrous materials

Mandrel Diameter and Wall Thickness

Ø1–30 mm mandrels.
Wall thickness up to several millimeters.

Fiber Diameter

100 nm–3 μm .

Interchangeable Sizes

Length and dimensions available on request.

Tubular Scaffold Fabrication

For vascular grafts, conduits
and other tubular scaffolds.



Parallel-Electrode Cage Collector

Low-speed collection of aligned fibers

01

Custom Electrode Geometry

Specify the electrode count, spacing and dimensions.

02

Stable Low-Speed Rotation

Approximately 1–150 rpm.

03

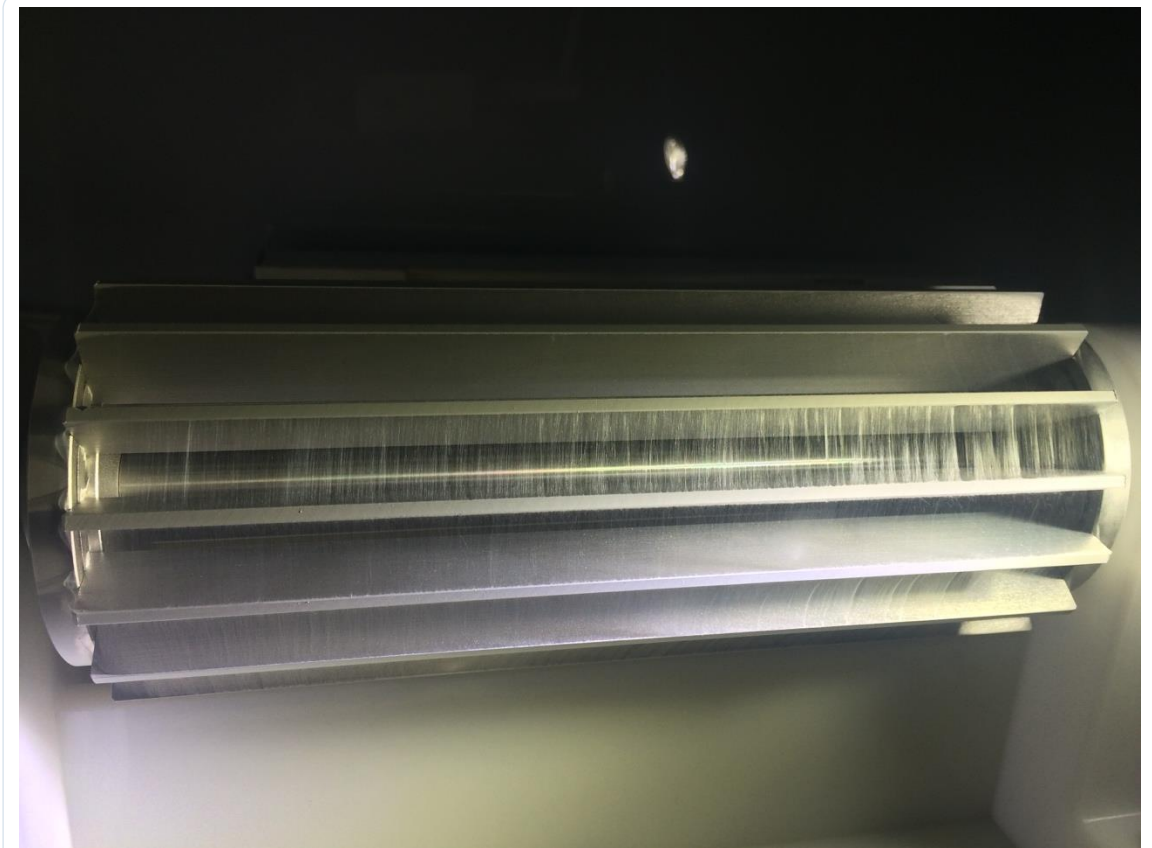
Porous, Aligned Fiber Layers

Combines fiber alignment with an open, porous structure.

04

Thick Fiber Mat Collection

Fiber mats remain flat after unrolling.



Coordinated X-Y Motion Stage

Precision motion for two-dimensional toolpath control

01

Large Area and High Load Capacity

Collection area: up to 300×300 mm.
Load capacity: 20 kg.

02

Versatile Substrate Compatibility

Deposits fibers or particles
on non-planar substrates.

03

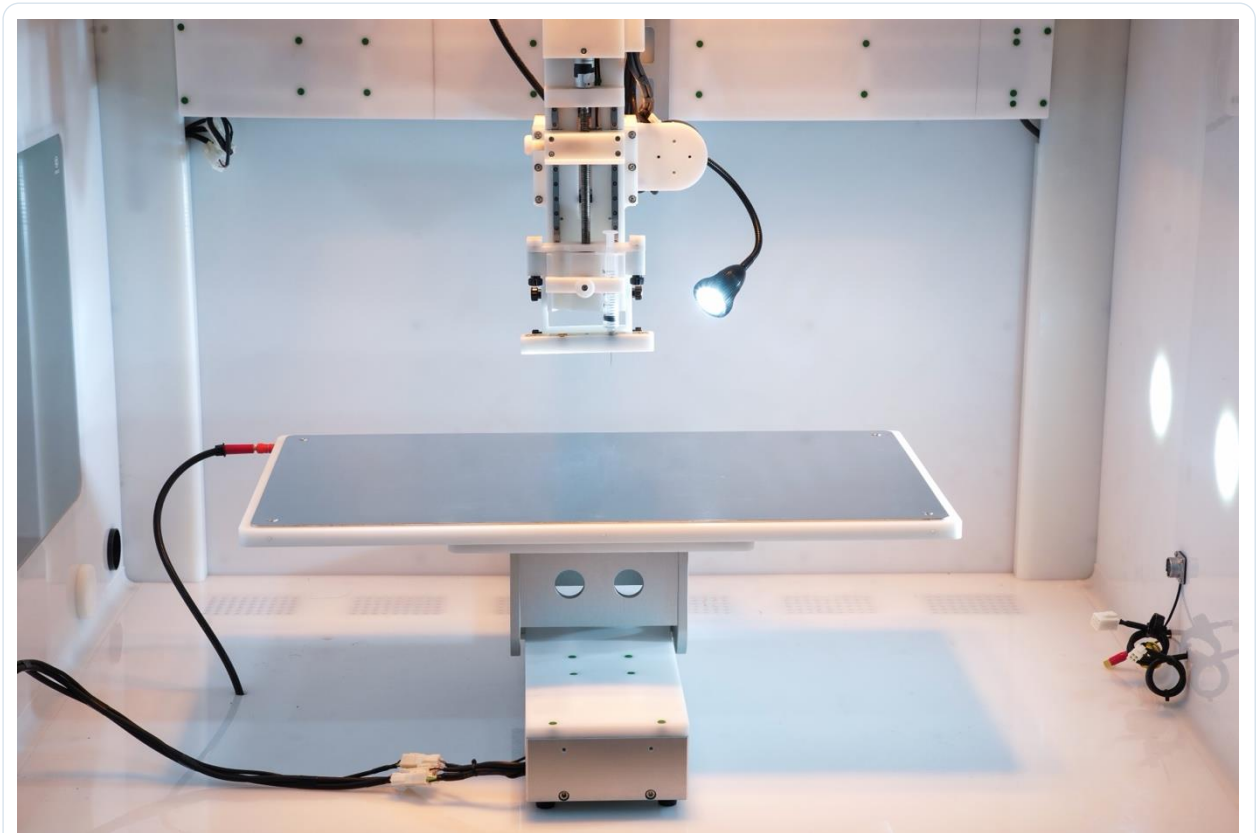
High Positioning Repeatability

Positioning repeatability: <50 μm .

04

Toolpath Import and Speed Control

CAD geometry and program import.
Speed: 0–40 mm/s.



Accessories and Dedicated Process Modules

Expand the platform for advanced materials research

01 Rotary Vacuum Chuck

02 High-Temperature Spinneret

03 UV Curing Lamp

04 In Situ Microscopy System

05 Ionizing Air Blower

06 Spiral Collector

07 Nanoparticle / Microsphere Module

08 Cross-Aligned Fiber Collector

09 Centrifugal Electrospinning System

10 Air-Assisted Electrospinning System

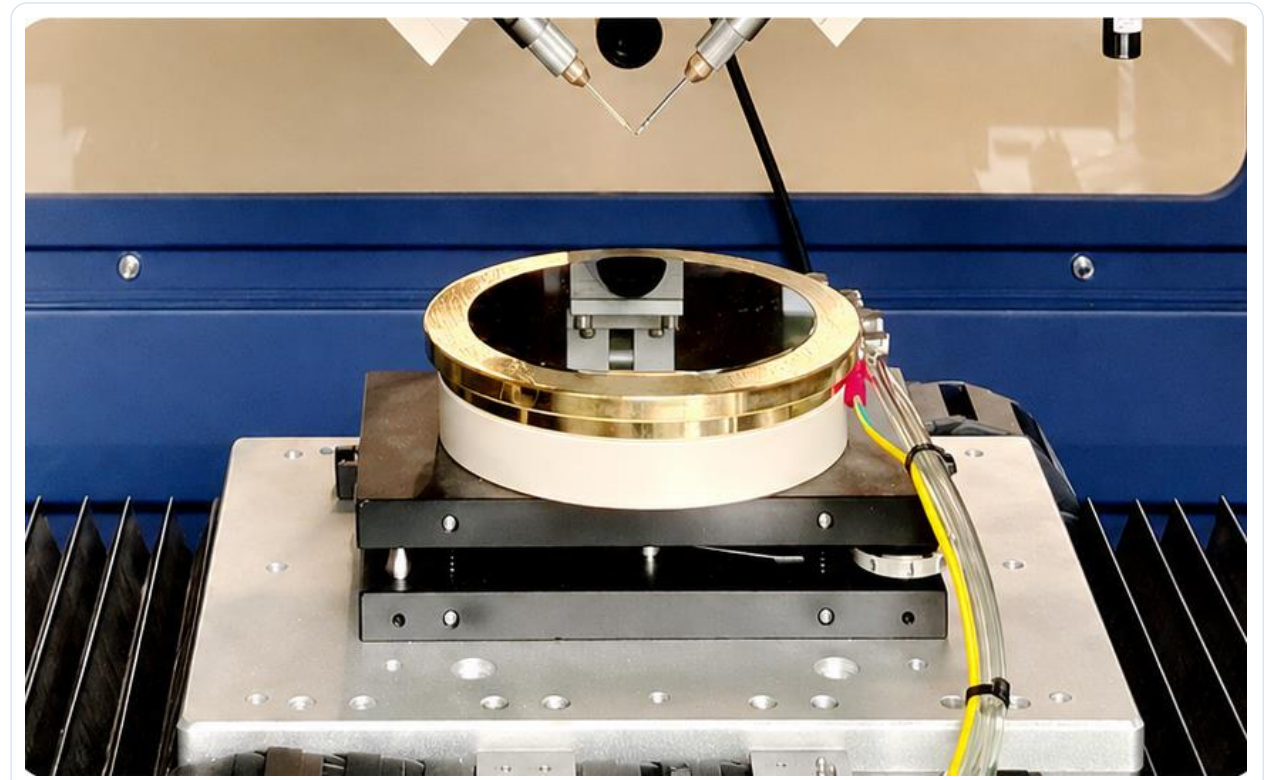
11 Roll-to-Roll Collector

12 Custom Process Modules

Rotary Vacuum Chuck

Secure holding of wafers and flat substrates

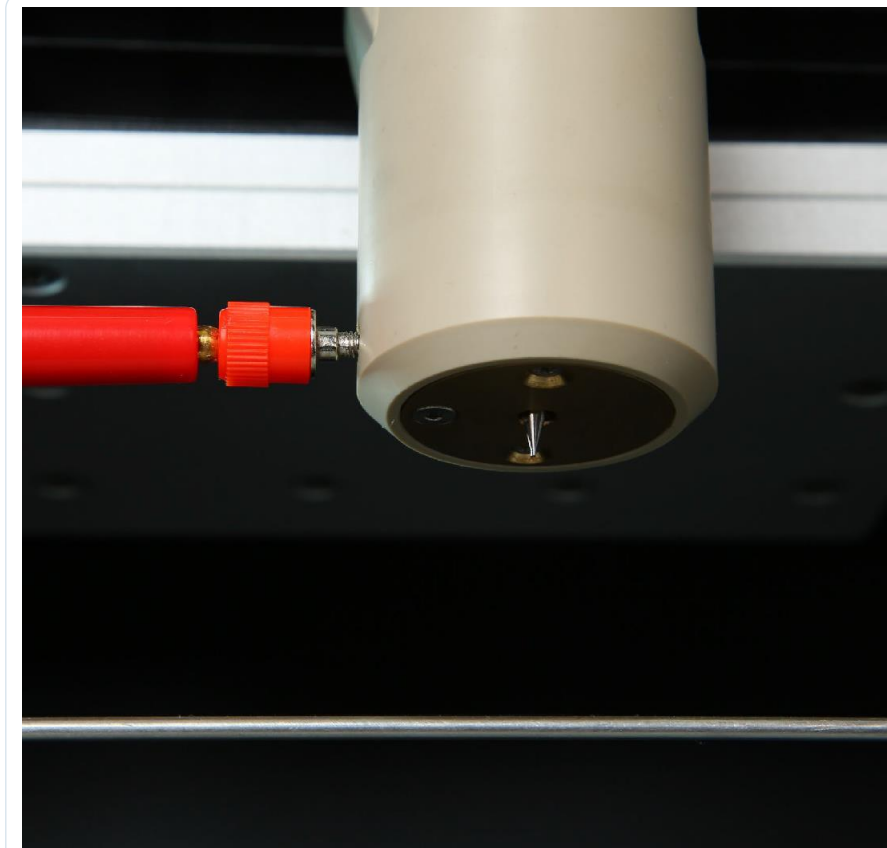
- 01 Multiple Substrate Materials**
For wafers, glass, PET, PI and metal foils.
- 02 Dual-Channel Vacuum Control**
Independent adjustment of suction in each channel.
- 03 Fine Position and Speed Adjustment**
Fine horizontal adjustment and variable rotation speed.
- 04 Substrate Size**
For 1–6 inch wafers and flat substrates.



High-Temperature Spinneret

Controlled heating and high voltage for thermally assisted direct writing

- 01 Temperature Range**
Room temperature to 150°C.
- 02 Positive High-Voltage Operation**
Supports positive high voltage up to 25 kV.
- 03 Sample Delivery**
Compatible with 5 mL glass syringes.
- 04 Thermally Assisted Processing**
For thermally assisted electrospinning and direct writing of low-melting materials.



Spiral Yarn Collector

Continuous production of nanofiber yarns with or without a core

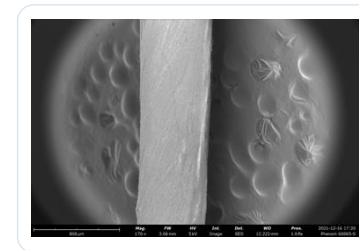
01 Helical Drawing
Promotes continuous, aligned fiber convergence.

02 Core-Spun and Coreless Yarns
Select the core material and collection process to suit the application.

03 Continuous 3D Accumulation
Continuously builds three-dimensional porous fiber mats.

04 Controlled Thickness
Control fiber-mat thickness through processing time.

Fiber microstructure: uniform, dense structure with a smooth surface.



Spiral Collector for Thick Fiber Mats

Build thick, three-dimensional porous fiber structures

01 Continuous Accumulation

Continuous electrospinning builds thick fiber mats.

02 Adjustable Mat Thickness

Control thickness through spinning time and process settings.

03 Preserved Porous Network

Maintains high porosity and a three-dimensional fiber network.

04 Multifunctional Materials Research

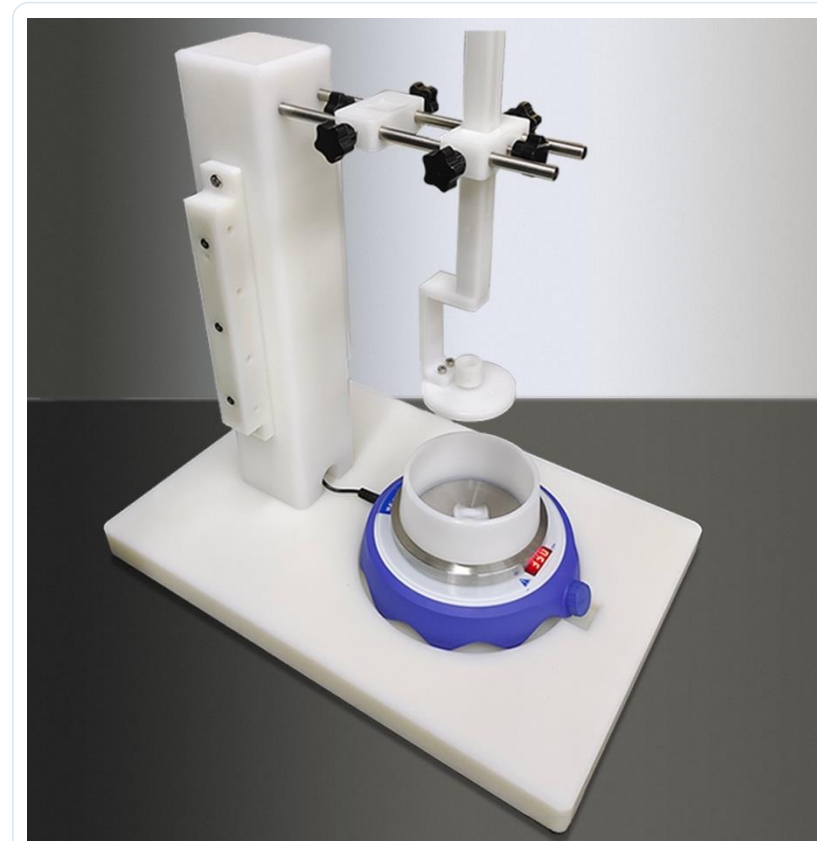
For solid-state battery electrodes, filtration, adsorption and tissue-engineering scaffolds.



Nanoparticle and Microsphere Module

Stable collection of nanospheres, short fibers and related structures

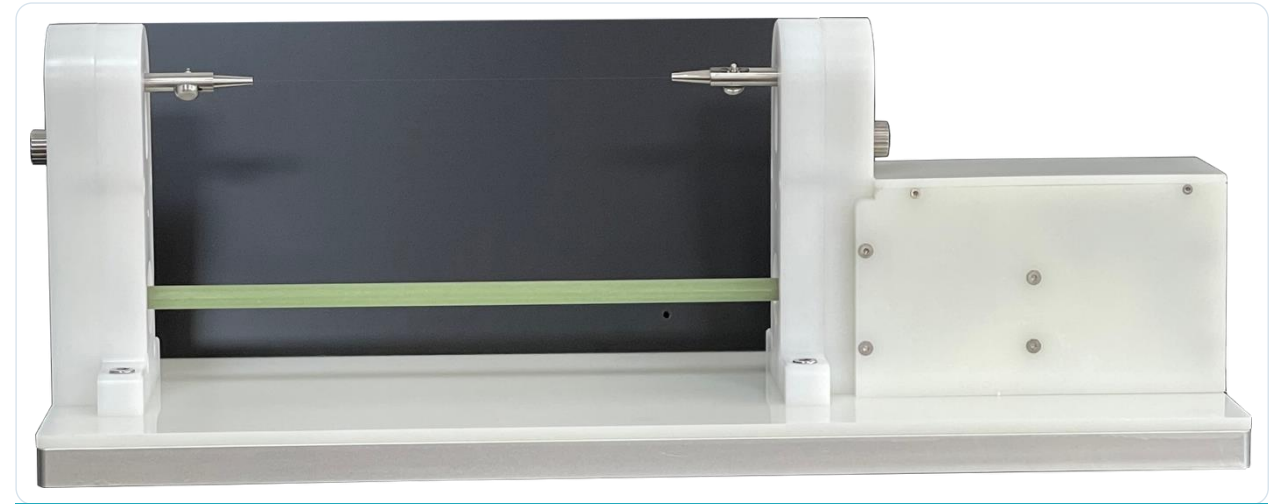
- 01 Liquid-Bath Collection**
Liquid-bath collection with magnetic stirring.
- 02 Reduced Particle Agglomeration**
Improves collection uniformity.
- 03 Flexible Configurations**
Multiple liquid-bath and auxiliary-electrode options.
- 04 Custom Bath Specifications**
Select bath dimensions to suit the sample and process.



Filament Nanofiber Coating System

Uniform nanofiber coatings on micrometer-scale filaments

- 01 Dual-Motor Drive**
Stable rotation of fine filaments.
- 02 Compatible Filament Diameters**
Approximately 10–1000 μm .
- 03 Rotational Speed**
Approximately 1–5000 rpm.
- 04 Uniform Nanofiber Coating**
Deposits a uniform nanofiber layer on microfilaments.



Air-Assisted Electrospinning System

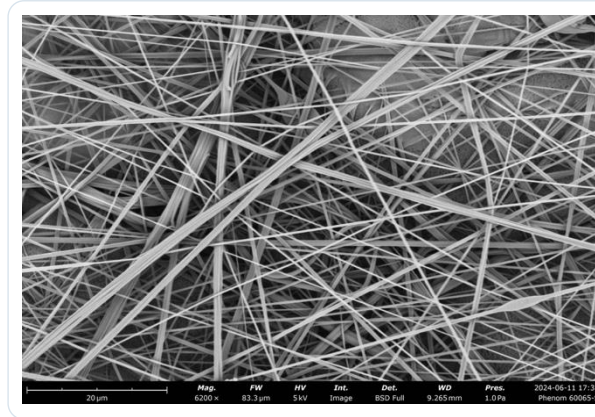
Airflow and electrostatic forces increase fiber production efficiency

01 Higher Throughput
Can deliver substantially higher output than conventional electrospinning.

02 High-Loft Fiber Mats
Produces three-dimensional porous fiber structures.

03 Diverse Fiber Morphologies
Supports cotton-like 3D structures and short nanofibers.

04 Material Compatibility
Suitable for a wide range of polymer solutions.



Cross-Aligned Fiber Collector

Ordered fiber structures with alternating 0° / 90° orientations

Ordered Multilayer Membranes

Produces unidirectional or cross-aligned multilayer fiber membranes.

Synchronized Dual-Disc Collection

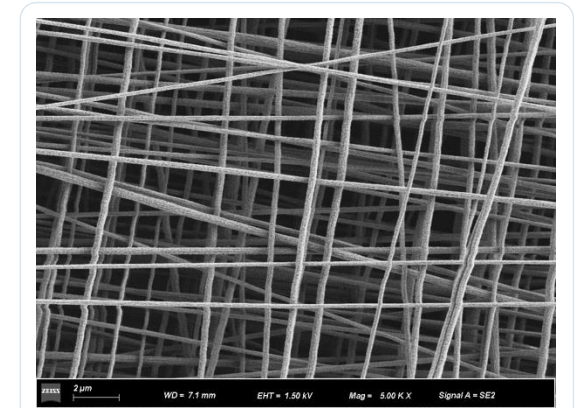
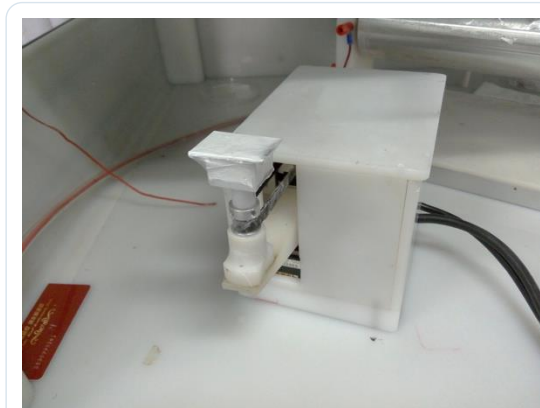
Stable, reproducible deposition of crossed fiber layers.

Adjustable Structural Parameters

Control layer count, orientation and fiber spacing.

Functional Structures

For tissue engineering and composite reinforcement.



Roll-to-Roll Collector

Continuous fabrication and collection of nanofiber membranes

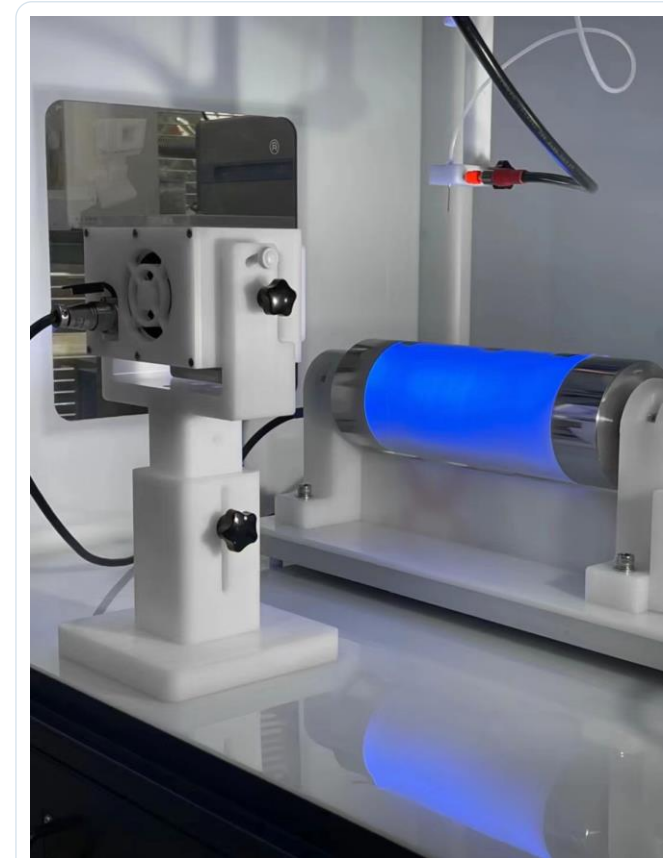
- 01 Collection Width**
Approximately 250–500 mm.
- 02 Continuous Production Length**
Approximately 50–100 m.
- 03 Take-Up Speed**
Approximately 1–40 mm/s.
- 04 Tension and Length Control**
Stable tension, preset winding length and automated continuous production.



UV Curing Lamp

Integrates curing into fiber fabrication

- 01 Automatic In-Process Curing**
UV curing during electrospinning.
- 02 Fewer Processing Steps**
Reduces secondary transfers and post-processing.
- 03 Uniform Illumination**
Even exposure for rapid curing.
- 04 Platform Integration**
Integrates with electrospinning and micro/nanoscale direct-writing platforms.



Centrifugal Electrospinning System

Combined centrifugal and electrostatic forces for high-throughput fiber production

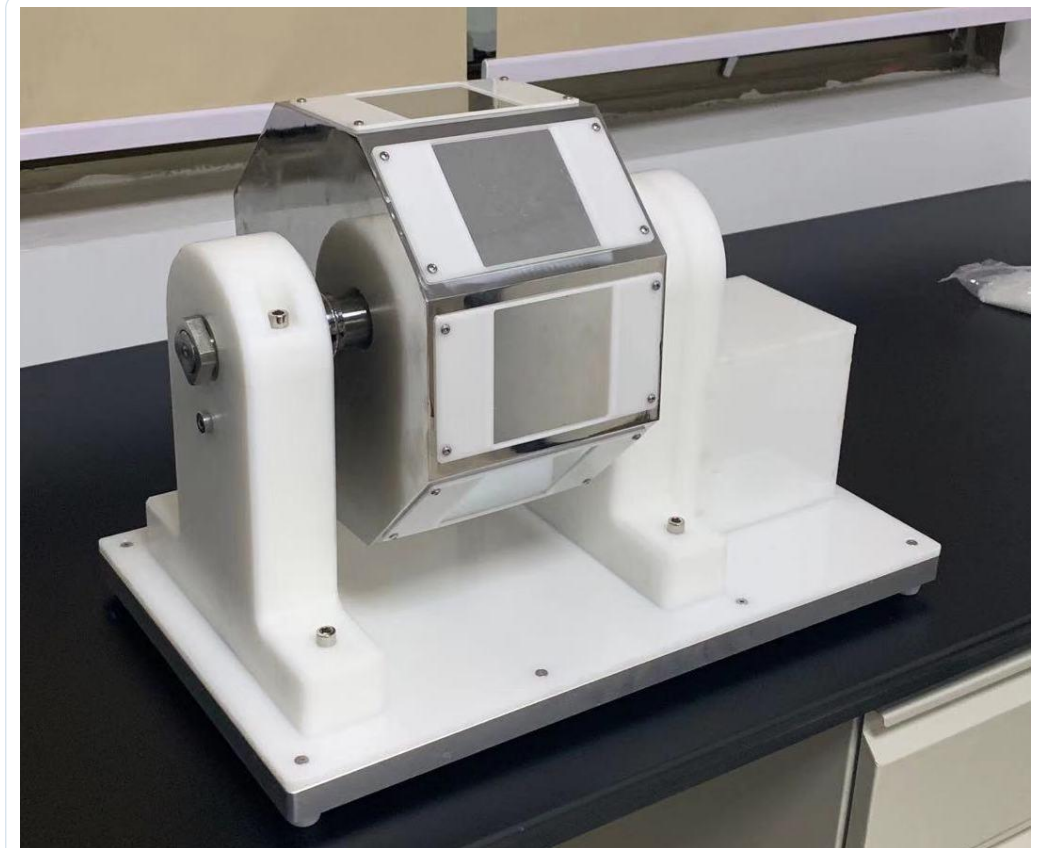
- 01 Combined-Force Fiber Formation**
Improves fiber formation efficiency and stability.
- 02 Solution and Melt Processing**
Compatible with polymer solutions and melts.
- 03 High-Throughput Membrane Production**
For rapid fabrication of nanofiber membranes.
- 04 Spinning Disc Size**
Diameter: approximately 650 mm.



Rotating Plate Collector

High-speed rotating plates for aligned fiber membranes

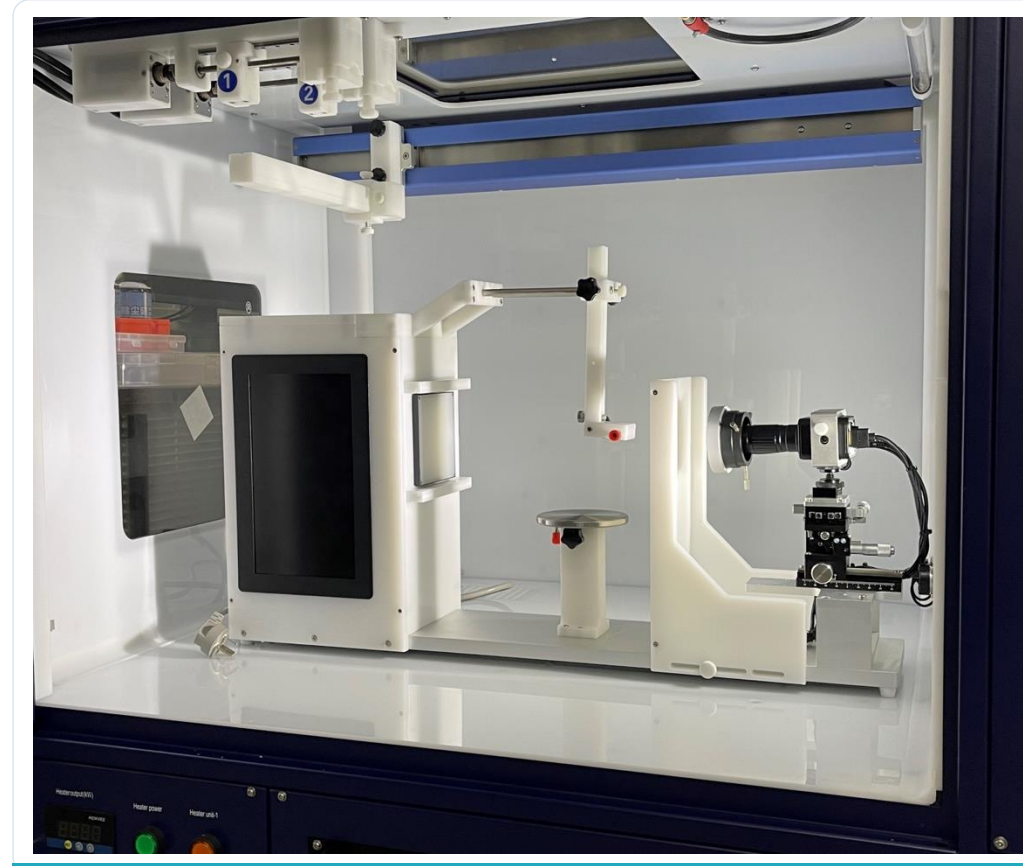
- 01 Servo Drive**
Continuously variable speed:
approximately 1–5000 rpm.
- 02 Consistent Fiber Alignment**
Rotation controls fiber orientation.
- 03 Multiple Fiber Arrangements**
Supports random, partially aligned
and highly aligned structures.
- 04 Standard Plate Dimensions**
Approximately 80 × 80 × 0.5 mm.



In Situ Microscopy System

Real-time observation of droplets and jet formation

- 01 High-Resolution Imaging**
Microscope combined with an industrial camera.
- 02 Visualization of Jet Formation**
Observe droplets, jets and Taylor cone details.
- 03 Fixed Relative Position**
Maintains the relative position of the lens and needle.
- 04 Process Optimization**
Helps evaluate and improve electrospinning stability.



Ionizing Air Blower

Neutralizes static charge for improved fiber deposition

01

Reduced Adhesion and Scattering

Neutralizes excess charge to improve collection.

02

Uniform Fiber Layers

Improves layer uniformity and consistency.

03

Improved Fiber Morphology

Reduces bead defects.

04

Assisted Solvent Evaporation

Promotes solvent evaporation and improves experimental safety.



Safety Features

Multiple protection functions for personnel and equipment



01

Emergency Stop

Rapid shutdown in an emergency.



02

Power Protection

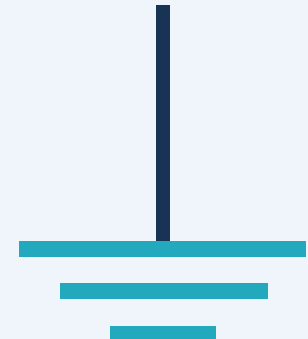
Automatic shutdown during overvoltage or overcurrent.



03

Door Interlock

Automatically disables high voltage when the chamber door opens.



04

Multi-Point Grounding

Reliable grounding of the enclosure, syringe pumps and collectors.

Equipment Dimensions

A spacious modular platform for laboratory installation

Width

1500 mm

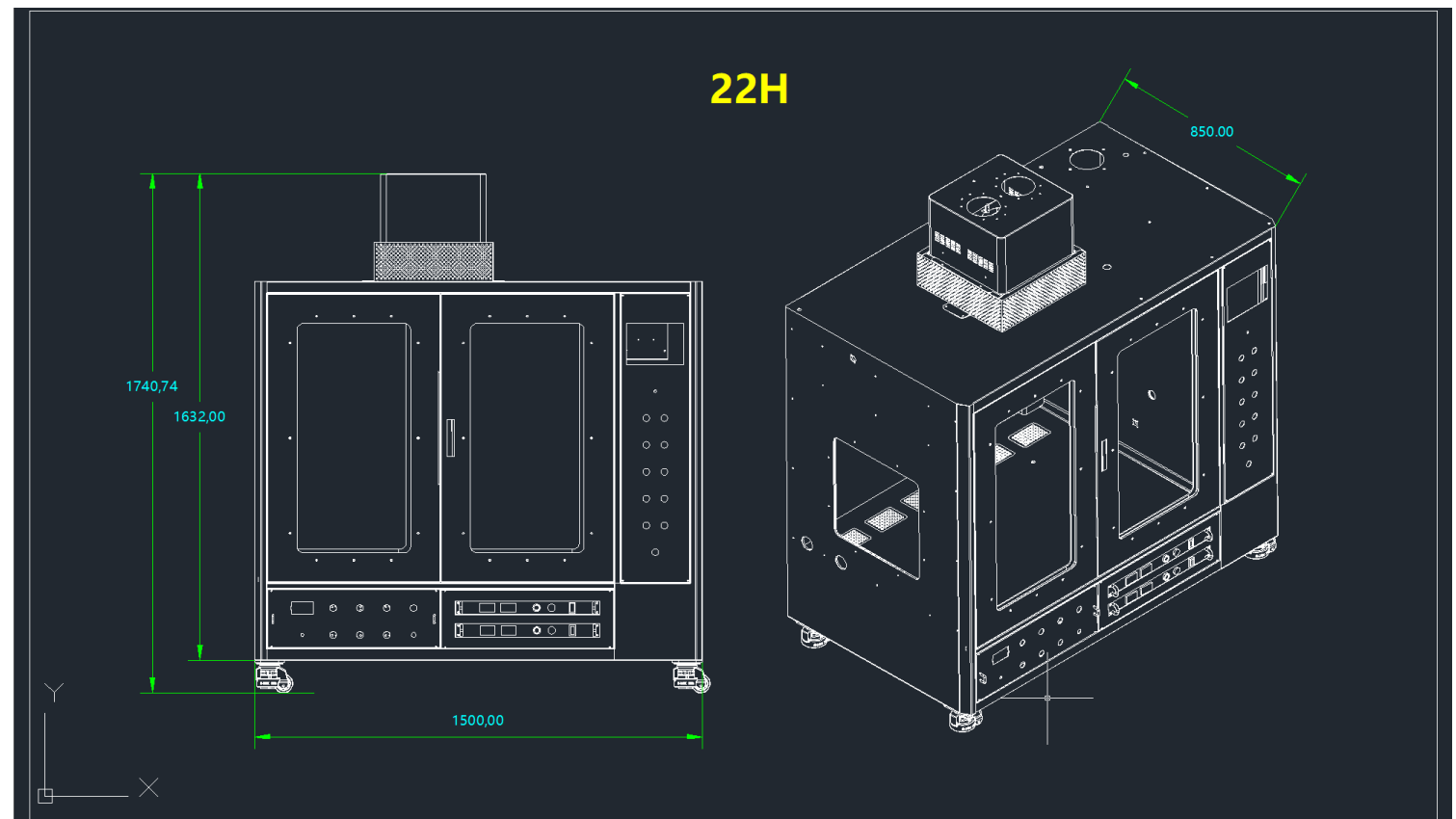
Depth

850 mm

Overall Height

1740.74 mm

Includes casters
and top-mounted components.
Installation layout
to suit the laboratory.



TL-OMNI All-in-One Platform

Electrospinning Without Equipment Limitations

A complete modular system for new materials, fiber structures and process requirements.

— 3-Year Warranty — Lifetime Maintenance — Software Upgrades — Process Support — Application Training