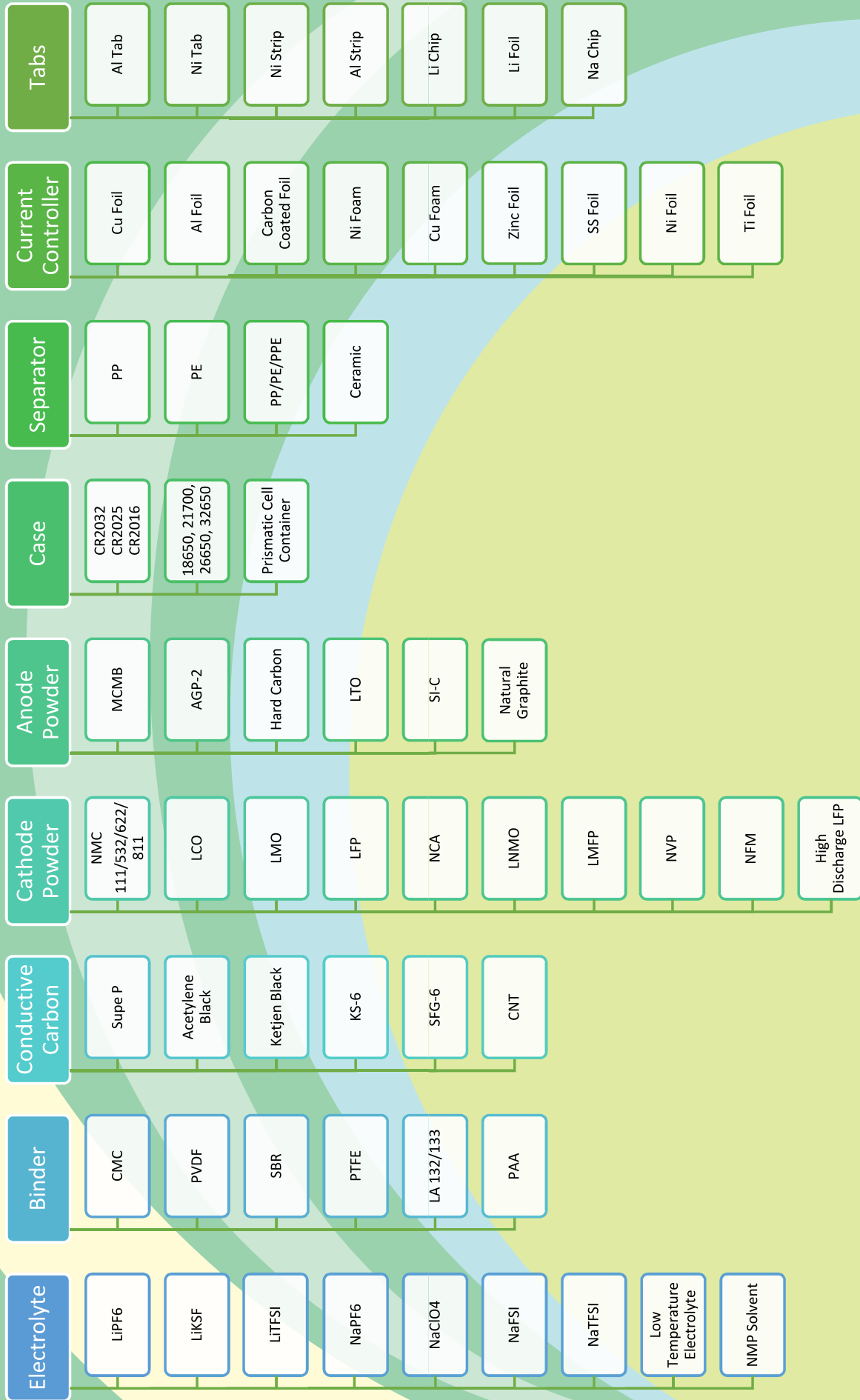




BAT-SOL

EQUIPMENTS & TECHNOLOGY

- ▶ **Battery** **2**
- ▶ **Fuel Cell, Electrolyzer, RFB** **14**
- ▶ **Thermal Chambers** **10**
- ▶ **Solar Cell** **18**
- ▶ **Safety Test Equipment** **10**
- ▶ **Coating / Printing Equipment** **19**
- ▶ **Electrochemistry** **11**
- ▶ **Photonics & Spectroscopy** **21**
- ▶ **Cleanroom Equipment** **23**



Laboratory Process

Baking



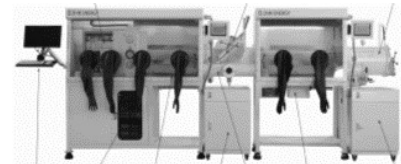
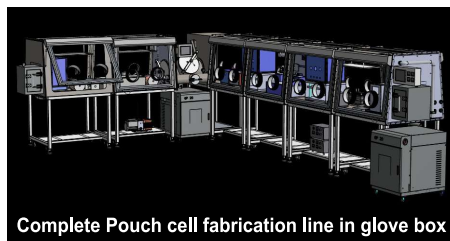
- High vacuum, low leak ovens & RT – 250°C
- 25 – 1000 liters volume
- Single or 2, 3 chambers with independent temperature control
- Inert gas purging facility
- Used for raw materials / Jelly roll baking

Milling



- Different types: planetary, omni-directional planetary, vibratory ball mill, jet mill, dual or 3D movement mixers
- These are ideal for mixing dry powders, reducing the particular size
- Options: Low temp, vacuum jacket
- RPM range: Up to 1000 RPM
- Ball and Jar material: Zirconia / SS / Tungsten carbide / Nylon / Alumina / Agate

Glove box



- Different types – circulation type, vacuum-and-purge type.
- H_2O , O_2 < 1 ppm in circulation type glove box.
- Moisture and O_2 sensors.
- Automatic purge gas control in purge box type.
- Automatic regeneration in circulation type glove box
- Specialized circulation type glove box for solar cell fabrication with thermal evaporator, spin coater and a load-locked pass-box between two sections of the glove box.
- Option : Heated Antechamber, freezer, dust collector etc.

Laboratory

Pilot/Production

Mixing Process



- Double planetary vacuum mixers with disperser and impeller.
- Desktop models to large industrial models.
- Mixing volume: 50 ml – 1000 liters.
- Dispersing RPM up to 6000 RPM, depending on the model built-in vacuum pump.
- Temperature control through external chiller unit.
- Facility to connect slurry filtration unit.

Coating Process



- Desktop models to large industrial models.
- Single sheet or R2R desktop version.
- Coating method options: blade, transfer, slot-die – continuous, intermittent, Stripe pattern.
- Built-in heater and exhaust system, PID temperature control up to 150°C.
- Configurable heating zones.
- Wide choice of width (50 – 900 mm), and length of coating area.
- Edge rectification, tension and speed control.

Calendering Process



- Desktop models to large industrial models.
- Single sheet or R2R desktop version.
- Electric or Oil heating (RT – 130°C) or without heating option. PID temperature control.
- Mechanical or hydraulic pressing adjustment, optional servo motor gap control.
- Wide choice of pressing width 100 – 900 mm.
- Optional edge trimming, dust collection.
- Asymmetric rolling press for Dry Electrode
- Edge rectification, tension and speed control.

Laboratory

Pilot/Production

Slitting Process



- Desktop models to large industrial models.
- Single sheet or R2R desktop version.
- Electric heating, Oil heating or without heating option.
- Edge burr $\leq 12 \mu\text{m}$.
- Mother roll width up to 900 mm.
- Slitting speed control
- Easy installation of slitting die for different slitting width.
- Edge rectification, tension and speed control.

Punching Process



- Electrode punching is used for coin, pouch and prismatic cells.
- Desktop single sheet to production level R2R models.
- Easily replaceable punching die of custom-made dimensions.
- Fully automated R2R models with Vacuum cleaning, edge rectification, CCD detection of electrode quality for prismatic and pouch cell.
- Smaller R2R version for Laboratory is available.

Welding Process

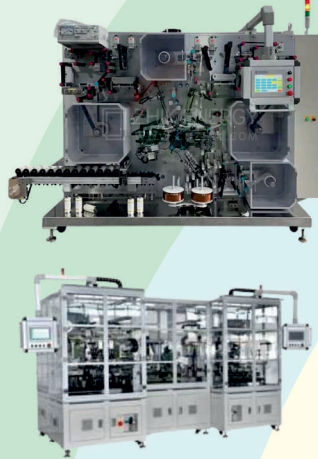
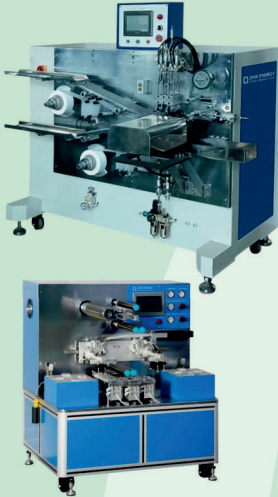


- Different types of welding mechanism with wide choice of welding power and pattern.
- Ultrasound welder for TAB welding for cylindrical, pouch and prismatic cells
- Spot welder for bottom welding and battery pack welding for cylindrical cells.
- 3-in-1 desktop Laser welder for prismatic cells.
- Desktop semi-automatic models to production level fully automated line for cylindrical and prismatic cells.

Laboratory

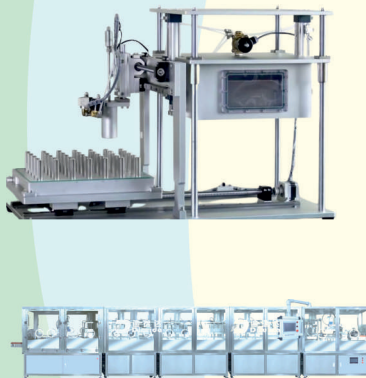
Pilot/Production

Jelly Roll Making Process



- Winding - cylindrical, pouch, prismatic cells.
- Z-stacking for pouch and prismatic cell.
- Semi-automatic and fully automatic versions.
- Auto separator winding with tension and rectification controls in all models.
- Wide choice of electrode width and length.
- Automatic electrodes pick-up and placing for desktop Z-stacking machine.
- High alignment accuracy, within 0.3 mm.
- CCD detection, Hi-pot testing for full-auto models.

Electrolyte Filling Process



- Single / multi station desktop Electrolyte filling machines for pouch, cylindrical, prismatic cells.
- Pilot / production multi station filling lines for cylindrical, pouch cell in special purge box.
- In-built programmable vacuum diffusion and degassing chamber and filling under vacuum.
- High accuracy, non-corrosive and programmable metering pump.
- Desktop models can be placed inside glove box.

Cell Sealing Process



- Crimping machines for coin and cylindrical cells, heat sealers for pouch cells, and laser welder for prismatic cells.
- Table-top manual / semi automatic models for laboratory; glove-box compatible.
- Hydraulic, Electric or Pneumatic control for crimping machines.
- Different types of sealing machines for pouch cells – top-side sealing, pre-sealing, final sealing.
- Fully automated production line machines.

Dry Electrode Battery



- 1) **VACUUM DEAERATION MIXER**
 - For Mixing dry powders. Can be used for both liquid and solids.
 - High speed centrifugal contactless mixing – up to 2800 RPM.
 - Degree of vacuum 0.1kPa - 101.3 kPa.
- 2) **FIBROTIC MECHANISM**
 - High speed jet milling machine.
 - Automatic powder feeder controlled by vibration frequency: 40-400Hz.
- 3) **ASSYMETRIC HOT ROLL PRESS**
 - Used for making free-standing electrode film.
 - Mechanical or Hydraulic control of pressing.
 - Independent speed controls of the two rollers.
 - Automatic vibrating sample feeder.

Super Capacitor Assembly



Feeding Machine

- Suitable for supercapacitors with a height of 40-150mm (adjustable)
- Suitable for supercapacitors (after welding the battery cell and assembling the O-ring on the upper cover) to be pressed into the interior of the casing.
- PLC control, human-machine interface display



Grooving Machine

- Suitable for super capacitors with a height of 40-150mm
- Suitable for the groove rolling, pre sealing and edge rolling forming process of supercapacitor.
- The rolling groove and sealing are both driven by servo motor.
- PLC control, human-machine interface display



Crimping Machine

- Suitable for super capacitors with a height of 40-150mm.
- Suitable for secondary molding, sealing, and edge rolling of battery and supercapacitor.
- The sealing height of super capacitors can be adjusted.
- PLC control, touch screen LCD display operation

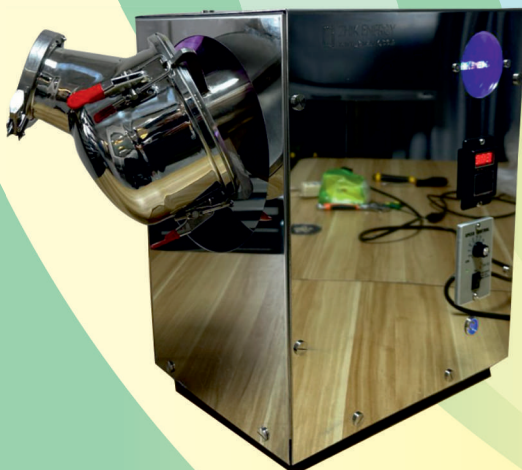
Coprecipitation Reactor



- ❖ Consists of feed tanks, synthesis reactor and an aging reactor
- ❖ All SS316 structure (Optional PFA coating) with temperature control, pH control and feed control system
- ❖ Reactor volume: 5L-100L
- ❖ Hot water bath temperature control 20°C - 95°C, accuracy $\pm 1^\circ\text{C}$
- ❖ pH value resolution 0.01, with control accuracy ± 0.1
- ❖ Two sets of agitator paddle - upper and lower, four blade turbine types, up to 900 RPM
- ❖ Four feeding ports include: Salt Solution, Alkaline Solution, Ammonia, Water, and standby port
- ❖ Touch panel control of all the parameters

Spray Dryer

- ❖ Air inlet/outlet temperature: 30°C – 300°C
- ❖ Maximum processing capacity: 500 ml/h - 10000 ml/h
- ❖ Suitable models for both Aqueous & Organic solvents available
- ❖ Nozzle Diameter: 0.5 / 0.7 / 0.75 / 1 / 1.5 / 2 mm



Dual Motion Mixer

- ❖ High speed sheer stirring, Powder gravity dispersion
- ❖ Volume of mixing tank: 2 / 5 / 10 / 50 L
- ❖ Tank speed: 0 - 30 rpm
- ❖ Slurry speed: 0 - 75 rpm
- ❖ SS Material barrel thickness: 2.0 mm
- ❖ Size of inlet & outlet: 76 mm
- ❖ No dead space



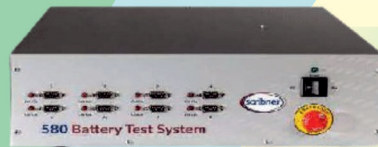
BTS 4000 series Battery Testers

- 5 V, 10 mA – 12 A.
- Triple range with 0.05 % of accuracy of voltage and current.
- 8 independent channels per module.
- TCP/IP interface.
- Optional auxiliary voltage and temperature measurement channels.

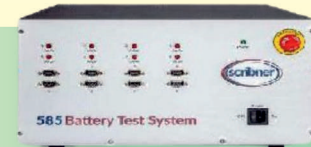


BTS 9000 series Battery Tester

- 5 V, 5A high precision, high-speed battery tester.
- Up to 8 independent channels.
- 4 current ranges with 0.02% accuracy in each range and voltage.
- 1 kHz data sampling rate,
- Integrated temperature channels.



580 Battery Test System with HFR
 Voltage - 2.000 V to +10.000 V
 Current ±1A in 6 ranges



585 Battery Test System with HFR
 Voltage: -4 V to +6 V
 Max. Current ±5 A / ±10A / ±20 A

ESTI NEXUS High Performance Battery Cyclers

- Powerful - Up to 90 Watts and 5 Amps
- Flexible - Mix and Match Channel Configuration
- Capability - EIS up to 200 kHz Per Channel
- Performance - Fully Independent Isolated High Precision Test Channels with full Potentiostatic and Galvanostatic Control

HIGH POWER SERIES

Battery Testing Systems
 Battery testers for testing battery packs.
 Voltage Range: 5V/60V/100V/200V
 Current Range: 10A/20A/30A/50A/100A/200A
 Many other voltage/current ranges...



Solid State Battery Testing Device

- PEEK (optional Si₃N₄ for heating) sleeve, transfer fixture, heating jacket with temperature controller
- Die diameter: 10 mm, 20 mm, 30 mm (inner) and 40 mm (outer)
- Temperature: Up to 300°C
- Pressure range: 0 – 150 MPa



Environmental Chamber Battery Safety Measurement



- ❖ **Desktop Constant Temperature Chambers:**
 - Desktop model – 25 L volume,
 - Temperature range: 15°C – 60°C.
 - Supports maximum 32 channels.
- ❖ **Large Constant Temperature Chambers:**
 - Stand alone model – 200 or 500 L volume.
 - Temperature range: 10°C – 85°C or 0°C – 60°C.
- ❖ **High Low Temperature Chambers:**
 - Temperature range: RT – 150°C -70/-40/-20°C – 150°C.
 - Volume: up to 1000 L.
- ❖ Optional integrated battery testers.
- ❖ Seamlessly connects with the low-cost battery testers in a single battery testing software.
- ❖ Optional Explosion proof and Automatic fire extinguisher for high temperature Chambers.



IEC 62133, ECE R100, IEC 62619, UL 1642, UL 2580, UN 38.3 standard safety testing chambers for Li ion batteries, battery packs.

- ❑ Environment Chamber: -70°C – 150°C and 20 – 98 % RH.
- ❑ Double/single deck Burn-in chamber for temper aging test: RT – 150°C.
- ❑ Crush test chamber: crush pressure upto 50 kN, speed up to 1.5 cm/s.
- ❑ Altitude simulation test chamber: upto 50,000 ft altitude at RT.
- ❑ Temperature Control Battery Short Circuit Test Chamber: maximum short-circuit current 1000 A; Temperature range: 0 – 80°C.
- ❑ Thermal Abuse Test Chamber: RT – 150°C (Linear 5°C/min).
- ❑ Heavy Impact Test chamber: Drop Ball Weight: 9.1kg; Dropping Height: 0 – 770 mm (Adjustable).
- ❑ Battery Drop Test Chamber: Drop height: 0.3 – 1.5 m, free fall.
- ❑ Projectile / Burning Test Chamber: Bunsen burner with automatic ignition.
- ❑ Crush Nail Penetration Test Chamber: upto 20 KN pressure and 44 mm/s speed, adjustable, customizable nail diameter.
- ❑ Internal Short Circuit Test Chamber: -10°C – 80°C; max loading 200 kg, speed up to 5 mm/s, voltage range 0 – 60V.
- ❑ Shock Test System: up to 15000 m/s² Shock Impact Peak Acceleration; maximum load of the test specimen: 10 kg.
- ❑ Vibration Test System: upto 3000 kN sinusoidal or random excitation force, vibration frequency 3 Hz, maximum load of the test specimen: 100 kg.
- ❑ All the chambers are explosion proof with explosion-proof observation window.
- ❑ All the models have large touch-panel HMI, and facility for computer interface for monitoring and data recording.
- ❑ Optional video camera inside the chamber.
- ❑ Optional integrated voltage measurement channels.

Electrochemistry

Portable potentiostat/galvanostat: Up to 1A, $\pm 15V$
- Small foot print



WD200-EIS BiPotentiostat
WD100-EIS single channel
WD 40-DC BiPotentiostat



WaveNowXV

$\pm 10 \mu A$ to $\pm 100 \text{ mA}$, $\pm 10 \text{ V}$,
Single channel,
DC Methods, Portable



Integrated UV/Vis spectroelectrochemical system

- ❖ Avantes fiber-optic based AvaSpec-ULS2048-EVO UV/Vis Spectrometer, Light Source, Quartz Cuvette, Screen printed honeycomb electrodes, Cable & Connector
- ❖ Control potentiostat and spectrometer by a single Software Application



AfterMath

- ❖ Control and analysis software (included free with potentiostats)
- ❖ All standard electrochemical routines
- ❖ EIS equivalent circuit fittings (included free with EIS potentiostats)
- ❖ Free lifetime upgradation
- ❖ CV simulations (subscription based)



Wavenow Wireless

- ❖ $\pm 5 \text{ nA}$ to $\pm 150 \text{ mA}$, $\pm 8 \text{ V}$, Single channel
- ❖ DC Methods
- ❖ Wireless

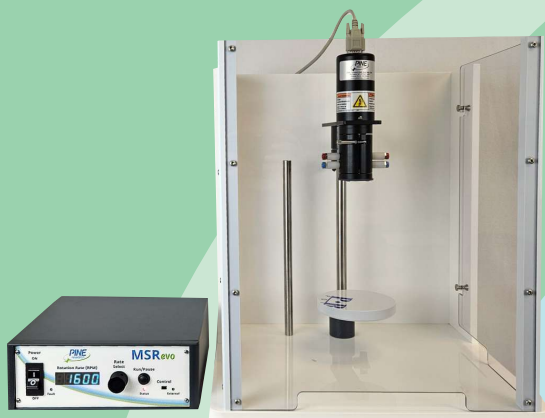
High Current Potentiostat / Galvanostat with EIS

- ❖ Output Voltage / Current: $\pm 5V$ / 20A, 50A, $\pm 100A$
- ❖ EIS Frequency: 1 mHz to 100 kHz (Optional 1 MHz)



MSR Evo Rotator

RDE/RRDE/RCE (ASTM standard)



Wave vortex (RDE/RRDE) Rotator

- ❖ Compact
- ❖ Up to 8000 RPM

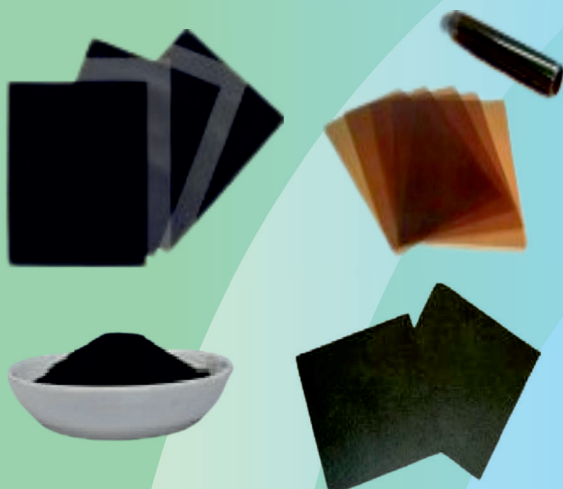
- ❖ Rotating Disk Electrode (RDE)
GC, Pt, Au, Ag & Pd
- ❖ Rotating Ring-Disk Electrode (RRDE)
Disk: GC, Pt & Au
Ring: GC, Pt & Au
- ❖ Rotating Cylinder Electrode (RCE)
Carbon Steel, Stainless Steel & Nickel Alloy
- ❖ High Collection Efficiency



- ❖ Aqueous / Non-aqueous Reference Electrodes
 - Single junction Ag / AgCl, Hg / Hg₂Cl₂, Hg / Hg₂SO₄, Hg / HgO
 - Double junction Ag / AgCl, Hg / Hg₂SO₄
 - Non-aqueous Ag
- ❖ Counter Electrodes: Pt wire, Pt mesh & Graphite
- ❖ Working Electrodes: GC, Pt & Au
- ❖ Other Electrodes: Honeycomb, Screen printed
- ❖ Electrochemical Cells: RDE/RRDE Cells with /without jacket, H-Cell (Standard & Separated), Corrosion cell, Alkaline resistant cell, Quartz Photoelectrochemical Cell



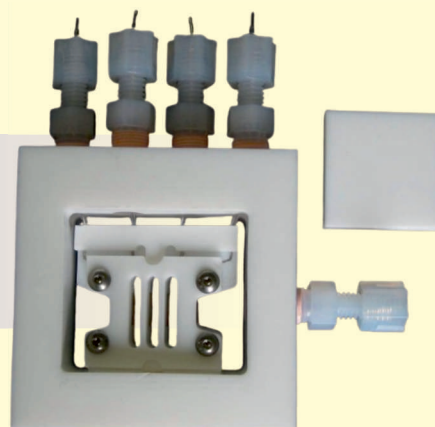
RFB / Fuel Cell / Electrolyzer Consumables



- ❖ Membrane
 - Anion Exchange Membrane
 - Cation Exchange Membrane
 - Bipolar Membrane
- ❖ Gas Diffusion Layer (GDL)
 - Carbon Paper / Cloth
 - Metal Foam / Mesh
- ❖ Catalyst
 - Pt-C/Pt-Ru/Pt-Ir/Pt-Pd/Pt-Ni
- ❖ Gasket
 - Teflon / Silicon / Mylar
- ❖ Gas Diffusion Electrode (GDE)
 - PtC Coated GDL/Pt-Ru Coated GDL

Membrane Conductivity Hardware

- ❖ In-plane conductivity measurement of bare membrane sample



H-Cell

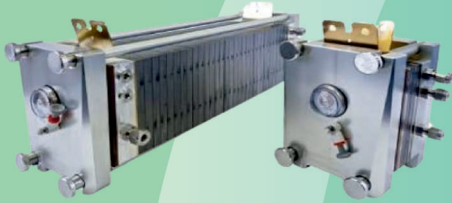
- ❖ Through-plane conductivity of electrolyzer membranes.



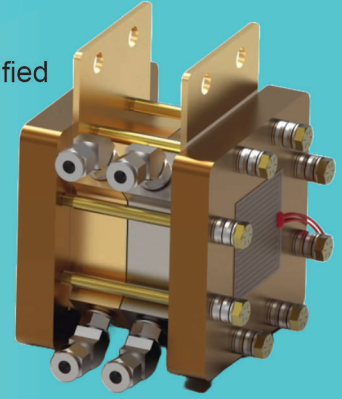
Devanathan-Stachurski cell

- ❖ Corrosion study via permeation of hydrogen
 - Two Cells / Electrodes / Accesoriess

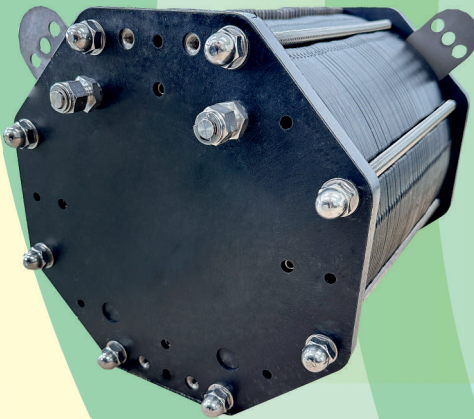
Fuel Cell, Electrolyzer RFB Hardware



- ❖ Single Cell & Stack hardware
 - Fuel cell
 - Redox Flow cell
 - AEM / PEM / CO Electrolyzer
- ❖ High pressure (upto 30 bar) NREL certified Electrolyzer Hardware
- ❖ Compressible type hardware
- ❖ Active Area: 5 - 256 cm²
- ❖ Flow Field
 - POCO Graphite, Platinized SS / Ni
 - SS / Anodized Al end plates
 - Cu current collectors



PEM/Alkaline / AEM Electrolyzer Cell & Stack



- PEM: Single cell - 50 cell stack
Active area - 100 cm² / 286 cm²
Power: Up to 20 kW
- Alkaline: Single Cell - 48 cell stack
Active area - 100 cm² / 700 cm²
Power: Up to 10 kW
- AEM: Single Cell - 24 cell stack
Active area - 100 cm²
Power: Up to 1.5 kW



PEM/Alkaline Electrolyzer with BOP

- Power Consumption: 2.5kWh - 1MWh
- Gas production / h:
 - Hydrogen gas : 500L – 20000L
 - Oxygen gas: 250L - 1000L
- Adjustable Pressure: Max 5 barg
- Purity of gas:
 - Hydrogen gas 99.7 ~ 99.9%
 - Oxygen gas 98%



Standard MEA Size Preparation 25/50/100 cm²



Ultrasonic Spray Coating Machine

- ❖ PEM, GDL, Electrode and Electrolyte Coating
- ❖ Coating Area: 400mm × 400mm
- ❖ 3-Axis precision coating
- ❖ Vacuum / Heated plate
- ❖ Thickness of the film: 100nm - 100μm
- ❖ Flow rate: 0.5-10 ml / min
- ❖ Self-cleaning ultrasonic nozzle
- ❖ Optional: Inert chamber, camera vision system, ultrasonic dispersion liquid supply system



Automatic / Manual heated Press

- ❖ Mold size: 30 cm x 30 cm
- ❖ Temp.: RT-300°C (optional 500°C)
- ❖ Multi-stage temperature controller
- ❖ Pressure range: up to 30 Ton

Automated MEA Solution

- ❖ Catalyst Slurry Preparation
- ❖ CCM Coating
- ❖ Raw Material Preparation (GDL/Boarder)
- ❖ GDL Glue Dispensing
- ❖ MEA-5/MEA-7 Automatic Assembly
- ❖ Final Inspection



Fuel Cell, Electrolyzer RFB Test Station



850 Multi-Range Fuel Cell Test System

Multiple current range electronic load choices:
5/25/50 A or 10/50/100 A, 100 W, 20 V
Suitable for up to 50 cm² PEM cells



840 Advanced Fuel Cell Test System

Electronic Load : 500W (12/62/125A or
25/125/250A) or 1 kW (50/250/500A), 20 V
Impedance spectroscopy & HFR option



620 Alkaline, PEM & AEM water electrolysis Test System

4 current range Potentiostat $\pm 0.07 / 0.7 / 7 / 20$ A, ± 5 V, 100 W
Programmable Power Supply for operation up to 100 A, 5 V,
500 W



740 Membrane Test System

Uses bare (non-catalyzed) membranes
Small sample size 6 mm x 30 mm



857 RFB/670 Electrolysis Workstation

0.07 A, 0.7 A, 7 A, 20 A current range
Electrolyte reservoir stirring and temperature
control.
EIS range: 1 mHz to 100 kHz



845 / 855 SOFC / SOEC Test System

Suitable for Button Cell, Planar Cell & Short stack
Zero volt load
Furnace controller with redundant
over-temperature controller



Fuel Cell Stack Test System:

Current range: $\leq 2000A$
Voltage range: $\leq 800V$
Power: $\leq 300kW$
Optional: CVM, EIS, Automatic Back Pressure Control

Electrolyzer Test Station

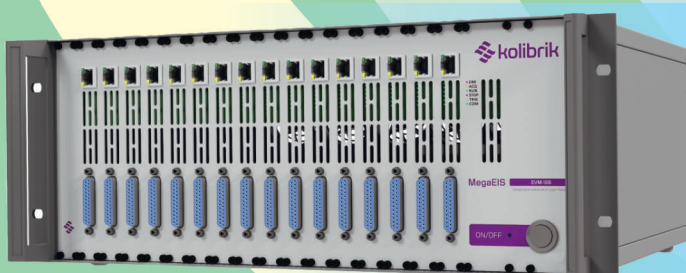
Alkaline / PEM / AEM Water Electrolysis
Power Supply, Potentiostat and Impedance Analyzer

Specification:
Power: Maximum 500 kW
Current: 10000 A
Option: Automatic Back Pressure Control, H_2 in O_2 & O_2 in H_2 sensor



SOFC / SOEC Stack Test Station

Load Bank: FC Mode
Power Supply: EC Mode
Including EIS, CVM, Reformer, and Furnace



EIS Option: Mega EIS

Input Voltage: Up to 1000V
Input Current: Up to 2000 A
Frequency Range: 1mHz - 100 kHz
No. of Channels: Up to 1024

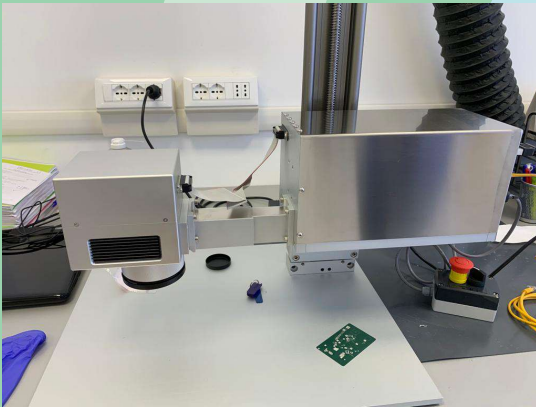
Solar Cell Fabrication Equipment and Consumables

Titanium Hot Plate



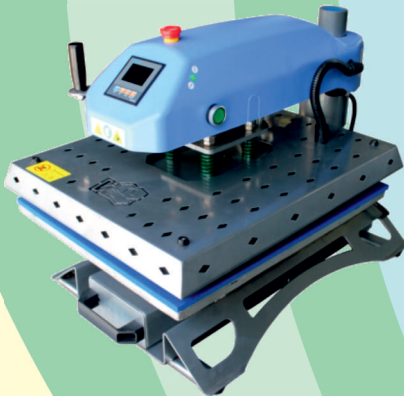
- Titanium hot plate for curing and baking substrates, working and counter electrodes to produce perovskite / DSSC solar cells and modules.
- Temperature range: RT – 600°C.
- 5 segment programming with set temperature, ramp time and Dwell time.
- Short heat-up time (600°C in 20 minutes).
- Surface temperature homogeneity: $\pm 2^\circ\text{C}$.

Laser Scribing System for P1-P2-P3 process in solar cell



- 355nm OEM Class Laser Writing System
- 4 laser system:
- Compact Air-cooled Single Unit
- Frequency range: 10kHz - 50kHz
- Pulse duration = 500-700 ps
- Integrated beam expander
- 160 mm f-theta lens (maximum field of work 100x100 mm)
- Scanning head with 10 mm opening
- Pushbutton panel with contacts and status LEDs
- Marking board and software
- Integrated high vision system magnification (maximum field of view approx. 4x3 mm) linked to SW for improved and easier alignment

Pneumatic Heat Press



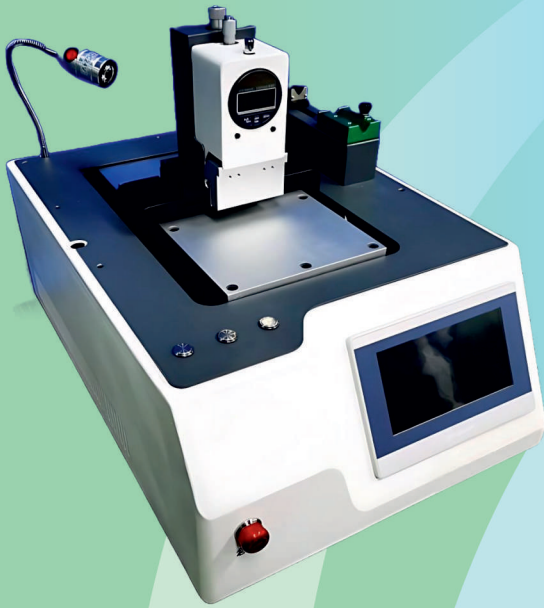
- Rapid assembly and permanent sealing of Perovskite and DSSC test cells.
- 38 cm x 38 cm plate or 40 cm x 50 cm plate.
- PID temperature control up to 299°C.
- Timer from 0 to 999 sec.
- Compact model.
- Very robust

Consumables

- Substrate : ITO coated Glass, FTO coated Glass, ITO-PET, ITO-PEN
- TiO_2 Paste
- Platinum Paste
- Silver Ink
- Dye & Sensitiser : N719, Z907, N749, K19, N3, C106
- Electrolyte
- Perovskite Precursor : Iodides, Bromides, Chlorides, Thiocyanates, Cyanates, Spiro Cobalt Complexes



High Precision Coating/Printing (Perovskite Solar Cell)

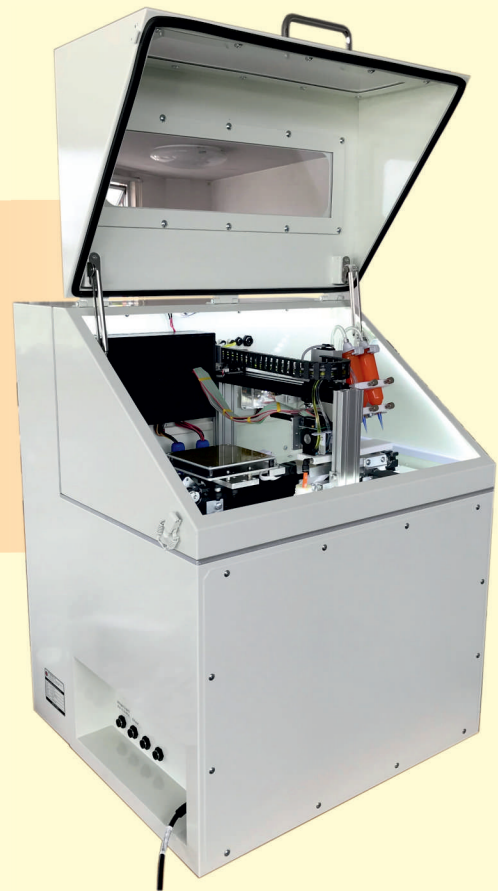


Slot die coater

- ❖ Coating area: Up to 300x 300 mm with heated vacuum chuck
- ❖ Heating Range: up to 150°C
- ❖ Servo motor control gap adjustment with precision 1µm
- ❖ Dry Film Thickness: 50nm - 20µm
- ❖ Optional heated slot die head
- ❖ Single Sheet / Roll to Roll Process

Inkjet thin film coater

- ❖ Print heads: piezoelectric, 128 active nozzles, 80 pl/droplet, 16.5mm print width
- ❖ Printable area: 120×120 mm
- ❖ Substrate Temperature: RT-100°C
- ❖ Including inert chamber and paste dispenser



Screen printer

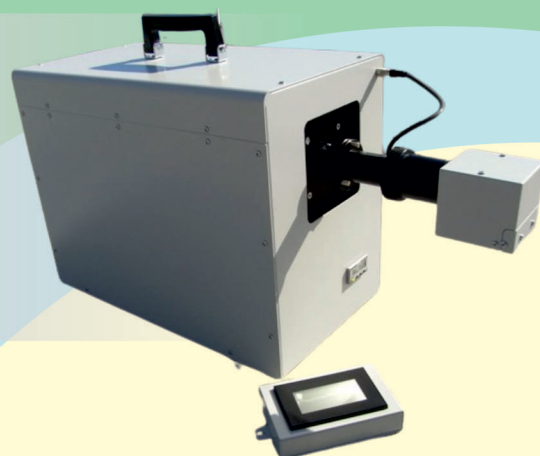
- ❖ Max. Print area: 600 x 400 mm
- ❖ Semi-automatic / Fully automatic
- ❖ Touch Panel Controller
- ❖ Customized Screen Design
- ❖ Optional: Camera Vision System

Solar Cell Characterization Equipment

20

Portable Solar Simulator, Class AAA type

- ❑ Illumination Area :
 - 40 mm x 40 mm (PEC-L01)
 - 160 mm x 160 mm (PEC-L15)
- ❑ Freely rotatable Illumination head at 360°
- ❑ Detachable touch-panel control.
- ❑ IV measurement system with software available
- ❑ Options : Standard Si cell, Temp Controllable cell stage



IPCE measurement system

- ❑ Xe Light source, Monochromator and Electronics in a compact design
- ❑ Wavelength range : 300 – 1000 nm
- ❑ DC / AC measurement
- ❑ White bias light option available

All-in-One Testing Platform

- ❑ Transient dark/SUN JV (prebias, hysteresis,);
- ❑ J_{sc}/V_{oc} vs Light intensity;
- ❑ Transient photo-current/voltage analysis;
- ❑ Charge extraction;
- ❑ Temperature resolved analysis;
- ❑ Electroluminescence;
- ❑ Stability measurements with looped routines;
- ❑ P&O Maximum Power Point Tracker;
- ❑ Potentiostat / Galvanostat; EIS, IMPS – IMVS IPCE

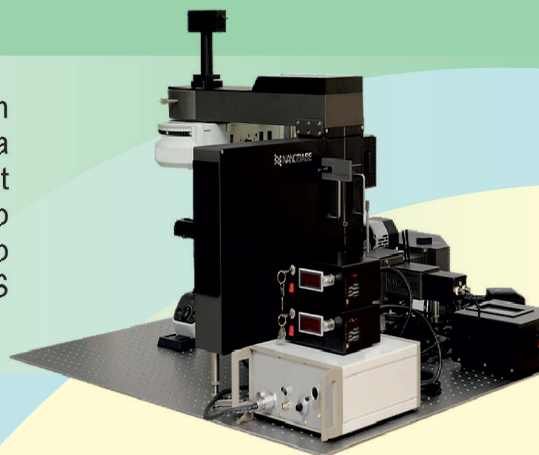


Hyperion IV LED Solar Simulator

- ❑ A+A+A+ Class
- ❑ Spectral Matching : $\pm 12.5\%$
- ❑ Spatial Non-Uniformity : $\pm 1\%$
- ❑ Illumination Area : In multiples of 10 cm x 10 cm
- ❑ LED Lamp life > 20000 Hours.



XperRF is a two-in-one instrument with a focus on enhanced material analysis. The instrument has a Raman spectroscopy module and a TRPL measurement module, both of which offer useful techniques to determine characteristics of a material. It's rather easy to note that this instrument is a combination of XperRAM S Series and Xper-FLIM.



XperRAM S Series is built with a versatile set of transmission spectrometer and high-performance detector that provides a high peak efficiency for a wide range of wavelengths covering 405, 532, 633, and 785 nm (1064 nm also available through customization).



XperRAM C Series is by far one of the most compact, budget friendly micro-Raman instrument products in the market.



In-situ RAMAN SPECTROSCOPY of Li ion battery – Couple any Xper series spectrometer with NanoBase® Battery Cycler (Page: 8) and EL-Cell® OPTO series cells





For light emitting devices like organic and inorganic LEDs the respective physical value is the external quantum efficiency, measured usually by electroluminescence (EL) method.



Absolute quantum yield spectrometer employs the PL (photoluminescence) method to measure absolute quantum yields



Microfocus X-ray sources specifically developed for 2D and 3D nondestructive testing. A small focal point prevents blurring of X-ray images and delivers a sharp, enlarged image.

Photodiodes, Photo Multiplier Tubes (PMTs), Multi-Pixel Photon Counter (MPPC) and many more.



Cleanroom Equipment and Consumables

PSD, PSDP and Thermal Series UV Ozone Cleaner:
For Atomically Clean Surfaces, UV Oxidizing, UV Sterilizing and UV Heat Treatment

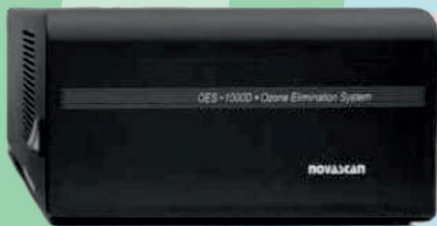
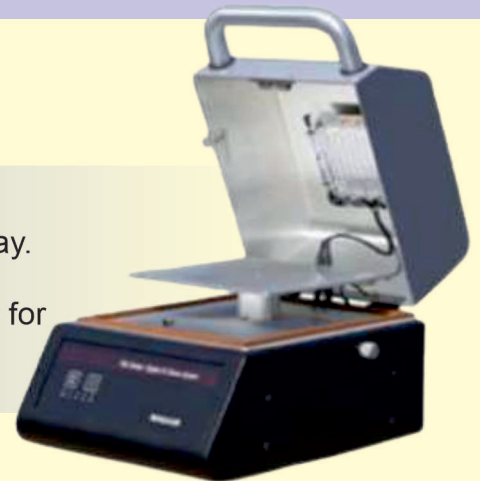


PSD Series

Preset Digital Controller. Convenient 2 button operation. Automated 15, 30, 45, 60, 90, 120 mins process time. Very simple set-up and use. Adjustable sample height state. Mercury vapour grid lamp with 5000 hours life. Safety interlock. Standard two gas ports. Thermal UV, temperature up to 150 deg. C.

PSD Pro Series

Programmable Digital Controller. Digital Count down display. Easily upgradable to the temperature-controlled system. Function 'pause' and 'interrupt' capability. Internal memory for previous settings.



Ozone Elimination System (OES-1000D)

Eliminates 99.9% ozone from chamber. Automated operation. Compact model. Can be placed beside or underneath UV Ozone system

PSD-UV - Benchtop UV-Ozone Cleaner

The PSD Standard and PSDP Pro Systems range in size from a 4x4" UV system that is ideal for AFM tips and microscope slides to a large 12x16" UV system capable of handling multiple wafers or LCD panels.



Silicon / SOI / Sapphire Wafer / Si Ingots etc.

As an experienced supplier of Si-Wafers, we supply almost any desired specification. You can find high purity wafers from Czochralski (CZ) and Float Zone (FZ) growth method. Sapphire-Wafers with a very low surface roughness in all orientations (C- A- R- M- Plane) and, if desired, with a miscut. Ingots are available in different diameters and lengths.



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