一、The Configurations of SC-3100

● Obtained International Patent for bevel recovery.

● High-performance device to collect nano contamination from both hydrophobic surfaces and sides (bevel parts) of silicon wafers.

* Please note that bevel parts are when hydrophobic wafers only.

● Can sample wafers made of materials other than silicon wafers which the surface has been roughened by bulk etching. (such as SiC, GaN, sapphire compounds, the surface on blanket film wafer).

● Possible to recover ions other than heavy metals.

● Supply of recovery liquid and suction of recovery liquid after sampling are performed automatically.

● There is no specific skills needed of the operator as the sampling process is performed by the device, and everyone can operate it easily.

二、Appearance Pictures of SC-3100

三、Specification and Environmental Requirement

SC-3100 is the unit, having the specifications described below.

(1) Product Name: SC-3100 (Perfect for R&D and QC Labs) Wafer Semi-Auto Device of Surface Trace Metal Contamination Recovery for VPD-WSD / VPD-WSL/ICP-MS/TXRF Treatment (SC Series)

(2) Sampling Method: Constant Tangential Velocity, Quasi-concentric Sampling

(3) Holder Capacity: More than 100μL

(4) Wafer Size: 4”/4 inch (100mm), 5”/5 inch (125mm), 6”/6 inch (150mm), 8”/8 inch (200mm), 12”/12 inch (300mm)

(5) Sampling Speed: 0.2 - 50mm/sec

(6) Moving Pitch: 1 - 10mm

<Environmental Requirement>

(7) Atmosphere

Temperature:	15 C°	- 35 C° (Operation)
	0 C°	- 50 C° (Storage)
Humidity:	30%	- 80% (Operation)
	10%	- 90% (Storage)

Dew condensation must be avoided under any circumstance.

(8) Electric Power

Voltage:	AC 100V
Frequency:	50Hz or 60Hz

(9) Installation: Inside clean draft

(10) Weight: 35Kg

(11) Dimension: (W)600mm x (L)494mm x (H)600mm

*The height of at least 630mm is required to allow sufficient room for movement of N2 supply hose.

*The width of at least 800mm is required to keep sufficient room for handling a lifter and a regulator.

(12) PC and Cable

- The PC (at least Windows 10), shall be connected with SC-3100.
- 1280x720 or higher screen resolution.
- PC shall have 2 USB connectors.

四、The compliance frameworks of ANSI Z535.4 & OSHA

This section is written in strictly adheres to the compliance frameworks of ANSI Z535.4 (Product Safety Signs and Labels), OSHA 100-240V, high-pressure utility CDA(Clean Dry Air), robotic motion elements, and hazardous chemical chemistry (HF / HNO_3).

1. Intended Use and Safety Compliance Framework

The SC-3100 Semi-Automated Recovery System of Nano Contaminants is designed for industrial semiconductor cleanroom applications under controlled parameters. This equipment employs high-voltage electricity, pressurized gas CDA, automated kinetic mechanisms (the sampling arm and the turntable), and corrosive, toxic chemical mixtures containing Hydrofluoric Acid (HF) and low-concentration Nitric Acid (HNO_3).

Safe and reliable operation depends on strict adherence to the safety protocols outlined in this manual. The safety architecture and documentation of this equipment are engineered to satisfy the rigorous frameworks of:

- ANSI Z535.4 - Product Safety Signs and Labels Standard
- OSHA 29 CFR 1910 - Occupational Safety and Health Standards
- SEMI S2 - Environmental, Health, and Safety Guidelines for Semiconductor Manufacturing Equipment

2. Definition of Safety Alert Symbols and Signal Words

Safety alert symbols and signal words are used throughout this manual and on the physical machine labels to classify the severity of hazards. In accordance with the ANSI Z535.4 standard, always recognize and obey the following designations:

- 🔴 DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious irreversible injury.
- 🟠 WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- 🟡 CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury, or catastrophic equipment/property damage.
- 🔵 NOTICE is used to address operational practices and technical procedures not related to physical personal injury.

3. Critical Safety Signs and On-Tool Labeling Map

The following safety labels are permanently mounted to the chassis of the SC-3100 device. If any label becomes defaced, peeled, or illegible, immediately suspend equipment operations and

contact the manufacturer for replacements.

Label 1: Chemical Contact and Toxicity Hazard

- Signal Word: DANGER (White text on a solid red background)
- Pictograms: Corrosive Material (Chemical pouring on hand) & Acute Toxicity (Skull and Crossbones)
- Message Panel:

HYDROFLUORIC & NITRIC ACID HAZARD.

CONTACT WILL CAUSE SEVERE CHEMICAL BURNS, DEEP TISSUE CORROSION, SYSTEMIC TOXICITY, OR DEATH.

  - Do NOT operate this equipment without wearing a complete suite of chemical-resistant Personal Protective Equipment (PPE).
  - Ensure the facility exhaust is fully functional and interlocked prior to initiating automated chemistry steps.
  - FIRST AID: In case of skin exposure to HF, flush with copious water for 5 minutes, immediately apply 2.5% Calcium Gluconate Gel to the affected zone, and seek immediate emergency medical evaluation.

- Placement Location: Front enclosure panel adjacent to the Liquid Tank, Vial Stand, and chemical introduction portal.

Label 2: Hazardous Voltage and Shock Hazard

- Signal Word: DANGER (White text on a solid red background)
- Pictogram: High Voltage (Lightning Bolt Symbol)
- Message Panel:

HAZARDOUS VOLTAGE INSIDE.

CAN CAUSE SEVERE ELECTRICAL SHOCK, CORNEAL BURNS, OR DEATH.

  - Disconnect all primary AC electrical supply feeds and apply appropriate facility Lockout/Tagout (LOTO) padlocks before removing this protective service panel.
  - Verify input configuration matches tool specifications (AC 100-240V).
  - Never operate the power switch or disconnect cables with wet hands.

- Placement Location: Rear service panel covering the Power Supply Unit (PSU) and directly adjacent to the main AC power inlet.

Label 3: Pressurized Utility and Burst Hazard

- Signal Word: WARNING (Black text on a solid orange background)
- Pictogram: High-Pressure Gas / Projectile Hazard
- Message Panel:

HIGH-PRESSURE GAS HAZARD (CDA).

SUDDEN COMPONENT RUPTURE OR LINE BLOWOUT CAN CAUSE SEVERE PHYSICAL OR EYE INJURY.

  - Incoming supply pressures must remain strictly regulated within designated tool bounds.
  - Isolate the facility supply gas lines and completely vent/depressurize internal

pneumatic manifolds before adjusting or decoupling any fluidic/pneumatic fittings.

- Placement Location: Rear panel immediately adjacent to CDA incoming connection manifolds and main regulators.

Label 4: Moving Robotics and Pinch Point Hazard

- Signal Word: WARNING (Black text on a solid orange background)
- Pictogram: Hand Crush / Entanglement Hazard
- Message Panel:

PINCH POINT / MOVING MECHANISMS.
CAN CRUSH, SEVER, OR ENTANGLE HANDS AND FINGERS.

  - Keep hands, fingers, hair, and loose garments entirely clear of the sampling arm and the turntable paths during active automated execution.

- Placement Location: On the front clear safety place overlying the Turntable and adjacent to the Sampling Arm path of travel.

4. Facility Infrastructure and Installation Requirements

1). Environmental Air Flow (SEMI S2 Compliance)

The SC Series equipment MUST be placed entirely within an active, certified Clean Draft / Wet Fume Hood equipped with a constant face-velocity exhaust monitor. The air pressure regulation exhaust line located at the rear of the machine must terminate cleanly into the facility exhaust stream above the tool to ensure toxic acid vapors do not pool or migrate back toward the operator interface.

2). Electrical Isolation and Energy Control (OSHA LOTO)

The tool utilizes a universal AC 100-240V power grid. The facility upstream branch circuit supplying power to the machine MUST be provisioned with a dedicated, marked circuit breaker (minimum 5A rating) that fully supports OSHA-compliant Lockout/Tagout (LOTO) padlock hardware to ensure safe mechanical and electrical isolation during routine servicing.

3). Seismic and Anti-Vibration Tethering

Due to the precise tolerances required for automated nano-contaminant retrieval, the equipment MUST be firmly anchored to the fume hood floor or table structure to prevent tipping, tipping-induced chemical spills, or kinetic misalignment during seismic events.

5. Mandatory Personal Protective Equipment (PPE)

Per OSHA 29 CFR 1910.132, operators prepping chemical solutions (sampling liquid, wash liquid) or maintaining the internal fluidic plumbing are required to wear specialized protective gear. Standard cleanroom frocks and latex gloves provide zero breakthrough protection against Hydrofluoric Acid and are strictly prohibited.

- Eye and Face: ANSI Z87.1-certified chemical splash goggles layered underneath an integrated, full-length transparent chemical face shield.
- Hand Protection (Mandatory Dual-Glove Protocol): Inner Layer: High-tensile nitrile cleanroom gloves.
  - Outer Layer: Heavy-duty, long-cuff Butyl or Viton chemical-resistant gloves

certified for a minimum breakthrough duration of >480 minutes against Hydrofluoric and Nitric Acid mixtures.

- Body Protection: Full-length chemical-resistant rubber/synthetic apron or vest over cleanroom garments, coupled with integrated sleeve guards.
- Medical Emergency Preparedness: At least two unexpired tubes of 2.5% Calcium Gluconate Gel must be stored in a clearly marked first-aid station within 20 seconds or 50 feet of the tool workspace.

6. Emergency Shutdown Procedure (EMO)

In the event of a sudden chemical leak, mechanical collision, or electrical fire:

1). Smash the Emergency Off (EMO) button located on the front panel interface immediately. Actuating the EMO instantly cuts all auxiliary line power to the sampling arm and the turntable mechanism.

2). Evacuate the immediate vicinity if a toxic chemical cloud or fluid spill is detected.

3). Do not attempt to clear errors or reset the PC controller software until a qualified EHS specialist has fully evaluated and stabilized the system.