

NANO-MASTER SWC SERIES CLEANING SYSTEMS

Damage-free Megasonic and Chemical Cleaning:

NANO-MASTER offers Megasonic Single Wafer & Mask Cleaning Systems for the state of the art damage-free megasonic cleaning of substrates with the highest resolution patterns by controlling uniform distribution of the acoustic energy density across the entire surface of the substrate. Particle release off the surface is enhanced with chemical dispense and then the released particles are removed from the substrate surface allowing the least number of reattachments by sweeping off with the radial flow of the DI water. This patented technology provides reproducible and uniform cleaning of the wafers, masks, and other delicate substrates with maximum megasonic energy just below the damage threshold of parts to be cleaned.

Point-of-use Chemical Dispense System is designed for minimal use of chemicals. It provides programmable mixing of the chemicals on the substrate surface with controlled distribution over the full radii of the substrate. This design also makes precise control of chemical processing time by following it with megasonic DI water clean. Then the substrate is spin-dried with heated N2 or if desired with IPA, and therefore it provides "Dry-In-Dry-Out" one step processing

The SWC is the perfect tool with small footprint for all clean rooms, where the space is limited and small. The total process time can vary between 1-3 minutes for each substrate depending on the size and the cleaning options.

APPLICATIONS

- Patterned or Un-patterned Wafer Cleaning
- Ge, GaAs and InP Wafer Cleaning
- Post CMP Wafer Cleaning
- Cleaning of the Diced Chips on Wafer Frame
- Cleaning after Plasma Etching or Photoresist Stripping
- Cleaning after Lapping and prior to Bonding
- Cleaning of X-ray Masks, EUV Masks, Templates
- Pelliclized Reticle Cleaning
- Cleaning of Mask Blanks
- Cleaning Contact Masks
- Cleaning of the ITO coated Display Panels
- Cleaning of Ceramic Substrates w/ laser drilled holes
- Optical Lens Cleaning
- Megasonic agitation to enhance Lift-off Process



SWC 4000 Stand-alone Unit



SWC 3000 Table-top Unit

Nano-Master Inc' Response to Challenges in Cleaning

Cleaning Issues

Damage of the Megasonic
 Delicate Substrates
 Particle Size
 Particle Reattachment
 Organic Contaminants
 Inorganic Contaminants
 Metal Contamination
 Back Surface Defectivity
 Re-Contamination
 Passivation

Solutions

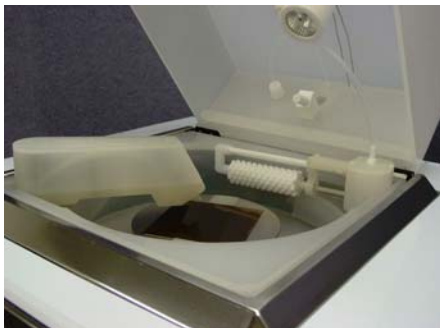
Patented Uniform Energy Deposition
 Megasonic Cleaning, Vacuum Chuck
 Megasonic Frequency
 Spin Processing
 Ozonated DI water
 Chemical dispense, pH Control
 SC1, SC2 Cleans
 Back Surface Clean with 1 mm Edge Contact
 Single Step Process: Dry In Dry Out
 In-situ

Models

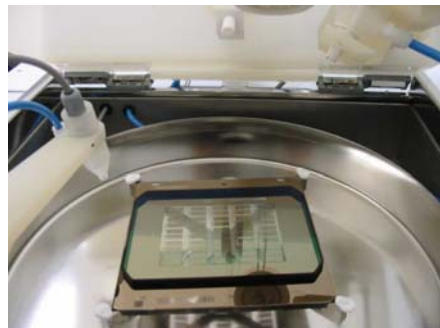
SWC-3000	Standard Table-top Model	Megasonic Cleaning Spin Dry with N ₂
SWC-3000-C	Table-top with CDU	Megasonic Cleaning Spin Dry with N ₂ Chemical Dispense Capability,
SWC-3000-M	Table-top for mask cleaning	Megasonic Cleaning (3MHz nozzle) Spin Dry with N ₂ /IR Lamp dry
SWC-4000	Standard Stand-alone Model	Megasonic Cleaning Spin Dry with Heated N ₂ Chemical Dispense, Acid and Solvent Separate Drain
SWC-4000-M	Stand-alone Mask Cleaner	Megasonic Cleaning (3MHz nozzle) Spin Dry with Heated N ₂ Chemical Dispense, Acid and Solvent Separate Drain
SWC-4000-MP	Pelliclized Reticle Cleaner	Megasonic Cleaning (1 MHz and 3MHz nozzle) Spin Dry with Heated N ₂ Chemical Dispense, Acid and Solvent Separate Drain

Additional Options

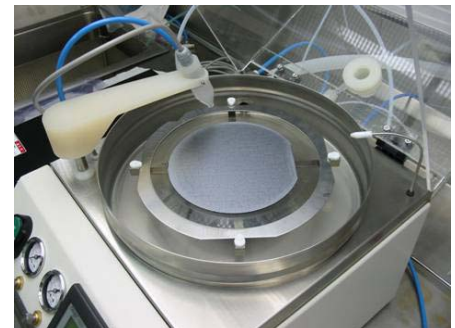
- Brush Cleaning
 - Full surface
 - Selective
- Ozonated DI Water (20 ppm)
- Hot DI Water Flush
- Heated Nitrogen
- Nitrogen Ionizer



Brush Cleaning



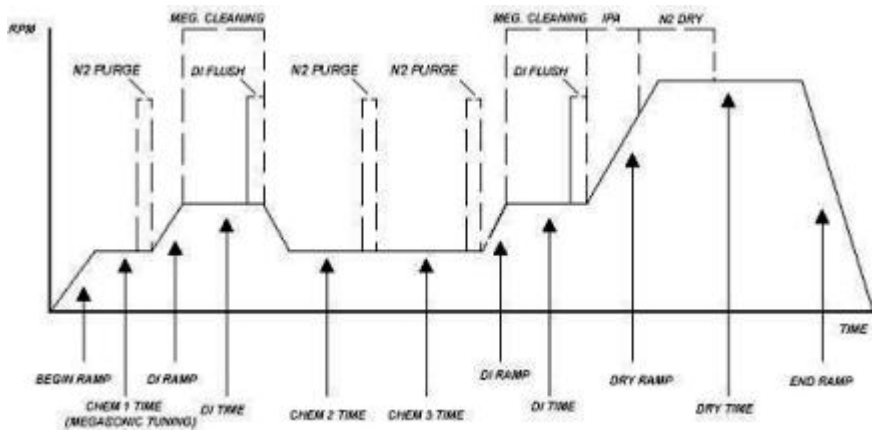
Cleaning of Reticles Pelliclized



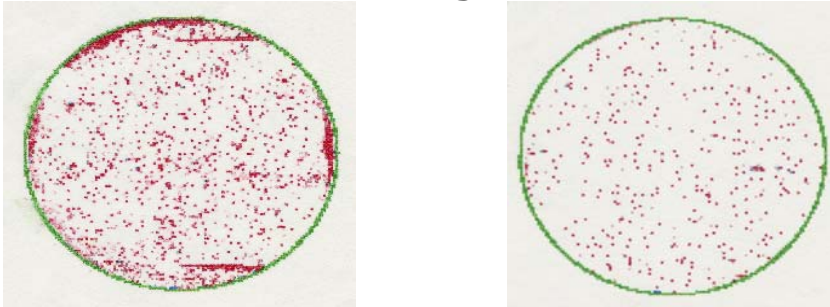
Diced Chips on the Wafer Frame



The following graph shows a typical SWC process:

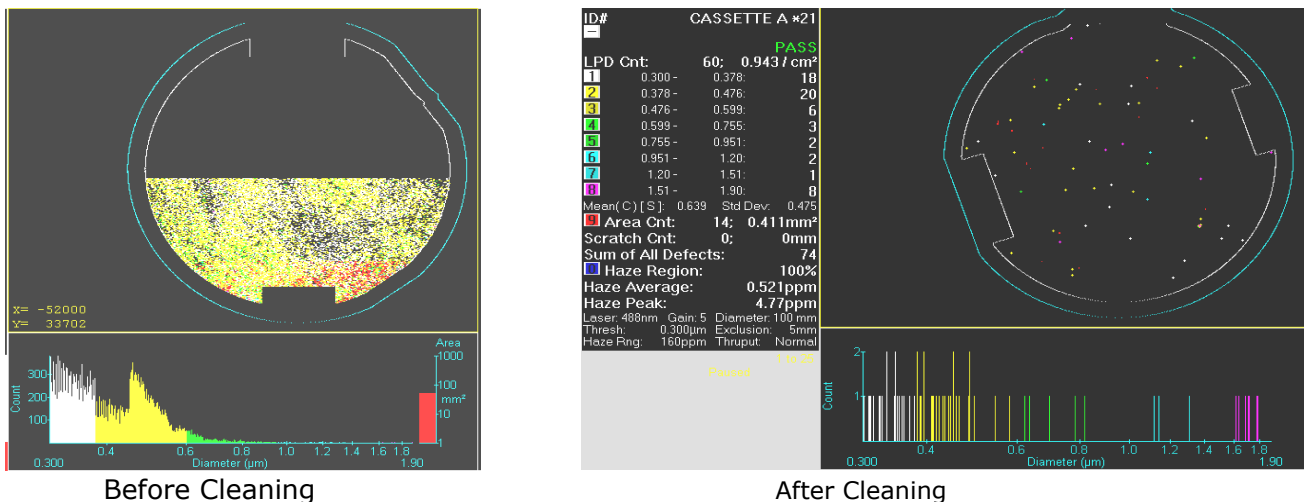


Germanium Wafer Cleaning



The pictures above were taken from the surface of two Germanium wafers, which were polished, and cleaned in parallel to compare the standard tank wafer cleaning (left) with Nano-Master SWC megasonic cleaning with DI water (right). The standard cleaning produced non uniform cleaning and the caused damage from spin drying (the cassette stress marks are evident). In other applications such as for ceramic substrates, AlTiC wafers, and ITO cleaning customer expectations were exceeded and yield improvements were experienced.

SWC Post-CMP Cleaning Performance



The first picture above was taken from the surface of a silicon wafer after the polisher. Half of the wafer was scanned because the surface scanner stops after the maximum total particle count was reached. The second picture is after cleaning with SWC system, 4 passes with the megasonic arm, total process time including drying is 1 minute and 30 seconds. No chemicals were used.

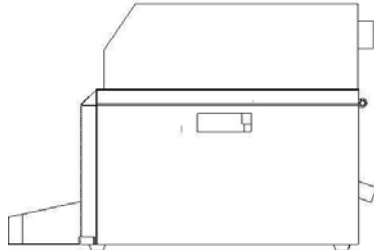
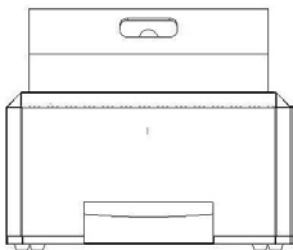
General Specifications

Maximum Wafer Size:	12"
Maximum Mask Size:	6"x6"
Typical Clean Time:	1 minute
Standard Megasonic Frequency:	1 MHz
RF Power supply Maximum Output:	60 Watt
Minimum DI Water Flow:	1.5 liter/minute
Maximum Spinner Speed:	4000 RPM
System Control	Microprocessor controlled with PLC programming
Loading and Unloading	Manual
N2 Heater (as option)	max 300 °C

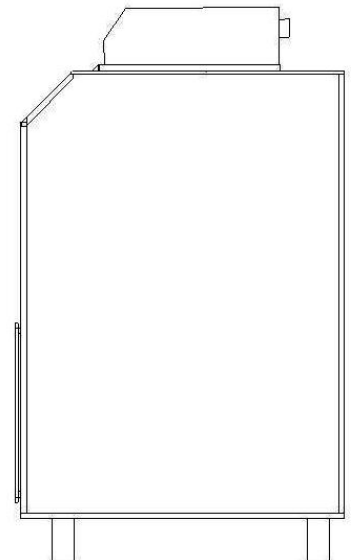
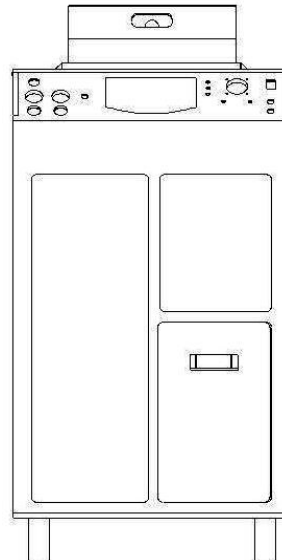
Facility Requirements

Power Input	110VAC, 15 A
CDA Input	2.2 cfm @ 70 - 80 psi for internal vacuum pump
Chemical Dispense rate	@15PSI of N2, 83ccm @20PSI of N2, 133 ccm
Drain	2 x 1.0" MNPT outlet for solvent and acid drains
Nitrogen	<20PSI
Exhaust (System)	1-2 cfm, 1"FNPT
Exhaust (Chamber)	>1-2 cfm 3/8" Tube
Oxygen for Ozonated DI Water option	9-12 PSI

Dimensions



SWC 3000 Front and Side View



SWC 4000 Front and Side View

	Width	Depth	Height
SWC 3000 Main Unit	18-3/4" (476 mm)	22-1/2" (572 mm)	16-1/4" (413 mm)
SWC 4000	26 (660 mm)	30 (762 mm)	52 (1321 mm)
RF Power Supply (SWC 3000)	11-1/8 (283 mm)	14-7/8 (378 mm)	5-1/4 (133 mm)
N ₂ /IPA Supply Box (Standard SWC 3000)	8-1/4 (210 mm)	10-1/4 (210 mm)	13 (330 mm)
Chemical Box (Option for SWC 3000)	8-1/4 (210 mm)	13 (330 mm)	22-1/4 (565 mm)

