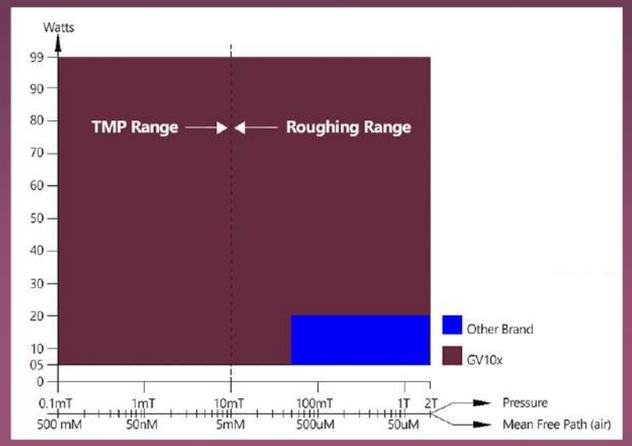
GV10x™
PLASMA CLEANER

The GV10x Downstream Plasma Asher process of producing plasma at low pressure is proven to be an inspired improvement beyond the traditional methods of mitigating contamination using cold trapping, nitrogen purging, and other type plasma cleaners.

The GV10x, with its extended operating parameters: power, up to 100 Watts, and pressure 2 to <0.5 E-3 Torr represents a paradigm shift of carbon mitigation in SEM, FIBs and other vacuum chambers where low carbon levels are required.

Plasmas of atomic oxygen and atomic hydrogen oxidize or reduce hydrocarbon contamination by converting surface carbons into gas phase molecules which are pumped out of chambers not just immobilized on trapping surfaces. Sample artefacts from polymerized deposits are minimized by low carbon levels in SEM chambers.



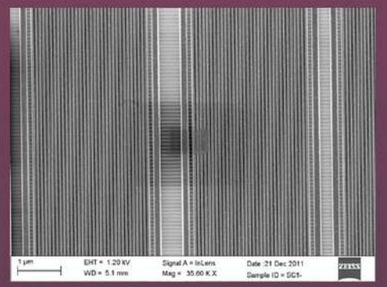
Turns Open	60 l/m Scroll Chamber volume 189 in³	Plasma ignited	71 l/s TMP Chamber Volume 189 in³	Plasma ignited	304 l/s Camber Volume 2004 in³	Plasma ignited
Variable Constriction	Chamber Pirani Pressure		Chamber Pirani Pressure		Chamber Pirani Pressure	
0	67 milliTorr	yes	2.8E-5 Torr	no		no
1	67 milliTorr	yes	8.9E-5 Torr	no	1.0E-5 Torr	no
2	67 milliTorr	yes	3.6E-4 Torr	yes	1.0E-5 Torr	no
3	67 milliTorr	yes	6.9E-4 Torr	yes	1.0E-5 Torr	no
4	83 milliTorr	yes	2.2 milliTorr	yes	1.0E-5 Torr	no
5	130 milliTorr	yes	5.8 milliTorr	yes	5.0E-4 Torr	no
5 1/2	170 milliTorr	yes	9.0 milliTorr	yes	7.0E-4 Torr	yes
6	210 milliTorr	yes	12 milliTorr	yes	8.0E-4 Torr	yes
6 1/2	260 milliTorr	yes	14 milliTorr	yes	8.0E-4 Torr	yes
7	310 milliTorr	yes	18 milliTorr	yes	1.0 milliTorr	yes
7 1/2	370 milliTorr	yes	24 milliTorr	yes	3.0 milliTorr	yes
8	450 milliTorr	yes	31 milliTorr	yes	5.0 milliTorr	yes
8 1/2	520 milliTorr	yes	40 milliTorr	yes	6.0 milliTorr	yes
9	590 milliTorr	yes	52 milliTorr	yes	7.0 milliTorr	yes
9 1/2	660 milliTorr	yes	70 milliTorr	yes	7.0 milliTorr	yes
10	720 milliTorr	yes				
10 1/2	810 milliTorr	yes		Grey boxes = Ideal operating range		

SCAN SQUARE ON WAFER

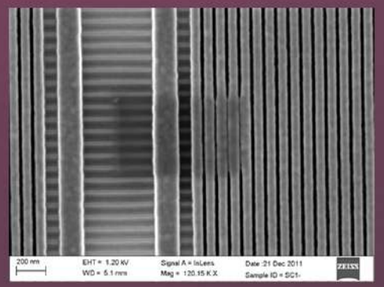
Infamous contamination rectangles are caused by polymerized HC 'schmutz' that accumulates on samples. The deposits on these dirty wafers were caused by scanning 10 minutes at 1.2kV.

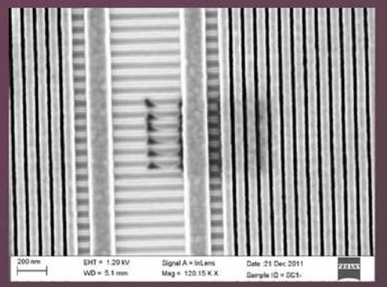
The ibss GV10x cleaner removed nearly all contamination build-up from the wafer surface after a total clean time of 13 minutes. It was noted that the line-widths before cleaning were significantly larger from the contamination build-up, but reduced back to the original line width after cleaning

The ibss GV10x cleaner cleaned the surface of the wafer (prior to imaging) and did not show signs of contamination build-up post cleaning.



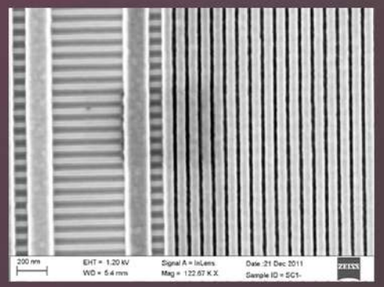
BEFORE :
Imaging Conditions:
- 1.2kV Accelerating Voltage
- 10 minutes scan time
- Chamber Pressure: 6.08-10-6 Torr





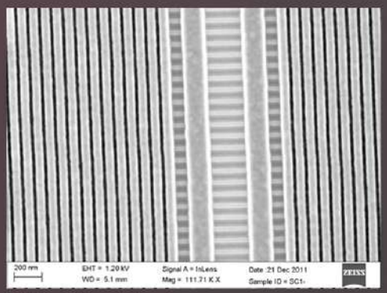
AFTER :
Imaging Conditions:
- 1.2kV Accelerating Voltage
- Chamber Pressure 6.08-10-6 Torr

Cleaning Conditions:
- Chamber Pressure: 7.53-10-4 Torr
- Power: 45 Watt
- Duration: 8 minutes (3mins plus 5mins)



AFTER :
Imaging Conditions:
- 1.2kV Accelerating Voltage
- Chamber Pressure: 6.08-10-6 Torr

Cleaning Conditions:
- Chamber Pressure: 7.32-10-4 Torr
- Power: 50 Watts
- 13 minutes (total clean time)



AFTER : Adjacent Area Scans
Imaging Conditions:
- 1.2kV Accelerating Voltage

Note:
After a total clean time of 13 minutes, no contamination was visible after scanning for 10 minutes

GV10x™

SYNCHROTRON APPLICATION

"Synchrotron radiation has become a powerful tool around the world. The increase of synchrotron laboratories highlights the interest by commercial, educational and medical science research for the analytical results possible with high-intensity light sources.

New generation synchrotron sources with enhanced performance such as free electron lasers (FEL) open new possibilities for fundamental and applied research. However a pressing requirement is to maintain the enhanced performance of these reflective and transmission beamline optics. By eliminating the carbon contamination from these optics and transmission filters. Carbon deposits are thought to be produced by cracking of CHx and CO2 residual gas molecules from photoelectrons emitted from the optical components. The deposition phenomena is rather complex depending on the specific case because Carbon molecules do not just consist of one single carbon allotrope but may also contain contributions from sp2 and sp3 hybridized carbon species.

The contamination seriously impedes high-performance beam lines by the reductions of photon flux, beam coherence, destructive interference and scattering losses. Previous publications [1-7] unless you show the reference as footnote I would skip this ref. have shown that it is possible to clean carbon contaminations in a safe and efficient way using an ICP, Inductively coupled plasma with different results from gas mixtures.

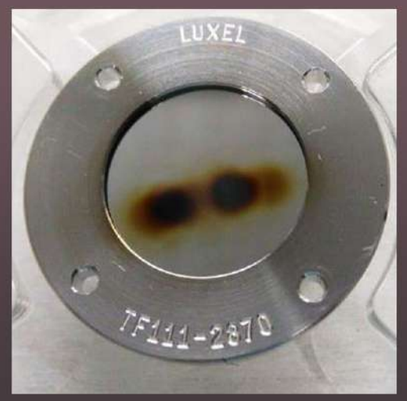
Oxygen and hydrogen plasmas gas mixtures are advantageous to clean carbon contaminations in that they activate a molecular gas by dissociation and chemical cleaning which unlike physical sputtering consists of the formation of volatile molecules on the target surface due to chemical reactions with incident chemically active species onto the surface."

- Moreno Fernandez, Harold Anibal Ph. D.

CARBON ON Al FILTER

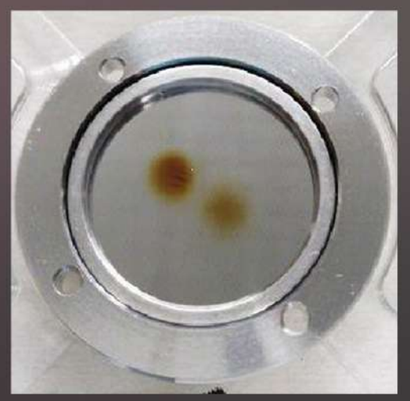
Using the GV10x chemical neutral plasma processing, carbon was removed from a 100 nm thick Al filter.

RF Power: 100W
Duration:110minutes



Before | Al- 100nm filter (front)

Before | Al- 100nm filter (front)
At an gle, wrinkles can be seen


Before | Al- 100nm filter (back)

After | Al- 100nm filter (front)
The wrinkles and contamination are eliminated


After | Al- 100nm filter (back)

GV10x Downstream Plasma Asher

P540 / P5QS Sources

P5 [1]Source Specifications	
Power (Watts)	10 to 99
Pressure	2.0 Torr to <5 mTorr pressure
Shutoff leakage rate	1E-8 Torr l/s, 1.3E-9 Pa-m3/s.
Plasma Driving Gas	Air, CDA, other gases or gas mixtures
Fitting	KF25, KF40 or Qwk-Switch™
Dimensions H x W x D	4.1 x 3.1 x 7.2 in.
	104 × 79 × 183 mm
Weight	3 lbs. / 1.4 kg

2U / Benchtop Controllers

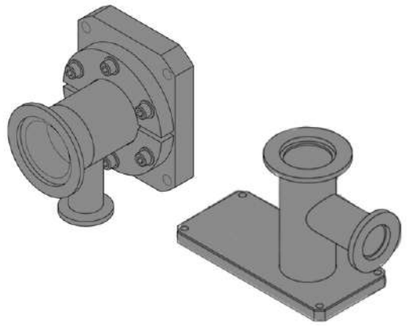
GV10x Controller Specifications		
	Benchtop	**2U Rackmount**
Dimensions H x W x D	6.81 × 8.2 × 17.25 in.	3.5 × 17 × 4.7 in.
	173 × 209 × 439 mm	89 × 432 × 374 mm
Weight	16 lbs. / 7.3 kg	17 lbs / 7.7 kg
Digital Interface	Yes	Yes
PC Operation	Opto-isolated COM Port for Windows OS	Opto-isolated COM Port for Windows OS
Software	GV10x Remote Control	GV10x Remote Control
Power Supply	100-230 VAC 50/60 Hz, 13.56 MHz RF Power consumption 500VA, Impedance 50 Ohms	100-230 VAC 50/60 Hz, 13.56 MHz RF Power consumption 500VA, Impedance 50 Ohms

PN#	GV10x DS Asher
P5C	Patented plasma Source & 1 ea. Spooler Variable Constriction, 0.5 µm inlet gas filter Controller & Cable bundle, MicroPirani Interactive GUI & Software
	GV10x for more than 1 SEM
PQC	Item A w/ Qwk-Switch Plasma Source
QS4T	Qwk-Switch Adapter w/ plug, 1 per SEM
SP	Additional Spooler

[1]GV10x DS Asher comprised of a patented Plasma Source and Controller
Contact ibss Group for hydrogen cleaning

Prices: FOB Burlingame, CA
Terms: Net 30 Days
Delivery: 8 weeks ARO
Warranty: Three Year Limited

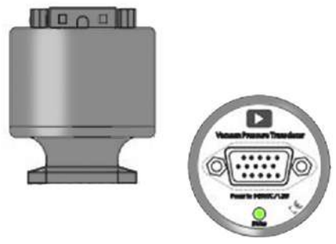
February 2019



Spooler

To mount the GV10x Asher Source onto SEM, TEM, FIB or other analytical instrument port, an adapter, called spooler, will be provided.

Customer must inform correct port dimensions and o-ring groove dimensions for the proper spooler to be supplied. A port location slightly above or in line with the sample stage is recommended.

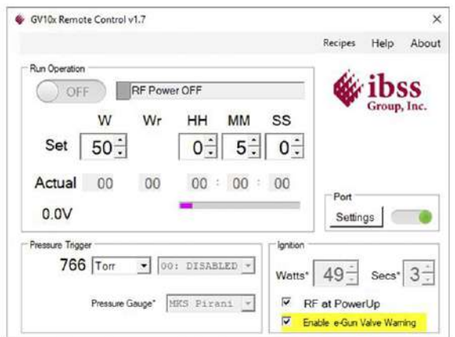


MicroPirani Pressure Guage

MicroPirani, a gauge that provides pressure reading at the plasma source.

With a range of $1x10^{-5}$ Torr to atmosphere, the pirani reading provides the user an easy way to adjust the optimum pressure for plasma ignition.

On load locks or the MCA chamber the MicroPirani offers auto plasma ignition at specified pressure with the 'pressure trigger' function.



GV10x Remote Control Software

ibss software provides user-friendly interface with various features.

- Compatible with Windows-based PC or Tablet
- Electron Gun Valve Warning
- Set cleaning Watts & Duration
- Set and monitor operating power during a run and pressure is select able from the Source Variable Constriction.
- Wide operating pressure range allows hydrocarbon removal at full TMP rotation without danger or interruption of system interlock software.
- Pressure Trigger: enables plasma ignition when Source pirani pressure reaches a selectable pressure.

W: ibssgroup.com | T: +1.650.513.1488

GV10x Downstream Plasma Asher w/ Conflat

P3CF Soruce

P3CF [1] Source	
Power (Watts)	10 to 99
Pressure	2.0 Torr to <5 mTorr pressure
Shutoff leakage rate	1E-8 Torr l/s, 1.3E-9 Pa-m3/s.
Plasma Driving Gas	Air, CDA, other gases or gas mixtures
Fitting	ConFlat
Dimensions H x W x D	6.2 x 3.1 x 9.51 in. 158 × 79 × 242 mm
Weight	6 lbs. / 2.7 kg

2U / Benchtop Controllers

Controller	Benchtop	2U Rackmount
Dimensions H x W x D	6.81 × 8.2 × 17.25 in. 173 × 209 × 439 mm	3.5 × 17 × 4.7 in. 89 × 432 × 374 mm
Weight	16 lbs. / 7.3 kg	17 lbs / 7.7 kg
Digital Interface	Yes	Yes
PC Operation	Opto-isolated COM Port for Windows OS	Opto-isolated COM Port for Windows OS
Software	GV10x Remote Control	GV10x Remote Control
Power Supply	100-230 VAC 50/60 Hz, 13.56 MHz RF Power consumption 500VA, Impedance 50 Ohms	100-230 VAC 50/60 Hz, 13.56 MHz RF Power consumption 500VA, Impedance 50 Ohms

PN #	GV10x DS Asher
P3CF	Patented plasma Source Variable Constriction, 3 µm inlet gas filter Controller & Cable bundle, MicroPirani Interactive GUI & Software

[1]GV10x DS Asher comprised of a patented Plasma Source and Controller
Contact ibss Group for hydrogen cleaning

Prices: FOB Burlingame, CA
Terms: Net 30 Days
Delivery: 8 weeks ARO
Warranty: Two Year Limited

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GV/GA

P540 / P5QS Sources

P5[1] Source	
Power (Watts)	10 to 99
Pressure	2.0 Torr to <5 mTorr pressure
Shutoff leakage rate	1E-8 Torr l/s, 1.3E-9 Pa-m3/s.
Plasma Driving Gas	Air, CDA, other gases or gas mixtures
Fitting	KF25, KF40 or Qwk-Switch™
Dimensions H x W x D	4.1 x 3.1 x 7.2 in. 104 × 79 × 183 mm
Weight	3 lbs. / 1.4 kg

2U / Benchtop Controllers

Controller	Benchtop	2U Rackmount
Dimensions H x W x D	6.81 × 8.2 × 17.25 in. 173 × 209 × 439 mm	3.5 × 17 × 4.7 in. 89 × 432 × 374 mm
Weight	16 lbs. / 7.3 kg	17 lbs / 7.7 kg
Digital Interface	Yes	Yes
PC Operation	Opto-isolated COM Port for Windows OS	Opto-isolated COM Port for Windows OS
Software	GV10x Remote Control	GV10x Remote Control
Power Supply	100-230 VAC 50/60 Hz, 13.56 MHz RF Power consumption 500VA, Impedance 50 Ohms	100-230 VAC 50/60 Hz, 13.56 MHz RF Power consumption 500VA, Impedance 50 Ohms

Stainless Steel Chamber

Gentle Asher A04 Chamber
$^1/_8$" N_2 vent
Down to 70 mTorr
Up to 3 TEM Holders
3-Position toggle (Pump-Off-Vent)
S/S 8" Ø chamber

PN#	GV/GA
P5C	Patented plasma Source & 1 ea. Spooler Variable Constriction, 0.5 µm inlet gas filter Controller & Cable bundle, MicroPirani Interactive GUI & Software
GA	Gentle Asher A04 Chamber
	Pump (Optional)
IDP3	Idp3 Dry Scroll Pump & Foreline – [120v or 240v]
	TEM Holder Sleeves (Optional)
TEM J	JEOL TEM Holder Sleeve & Plug
TEM F	FEI TEM Holder Sleeve & Plug
TEM H	Hitachi TEM Holder Sleeve & Plug

[1]GV10x DS Asher comprised of a patented Plasma Source and Controller
Contact ibss Group for hydrogen cleaning

Prices: FOB Burlingame, CA
Terms: Net 30 Days
Delivery: 8 weeks ARO
Warranty: Two Year Limited

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Mobile Cubic Asher (MCA)

1/8" N_2 vent
Up to 99 Watts at 13.56 MHz
Down to 70 mTorr
Shutoff leakage - 1E-8 Torr l/s, 1.3E-9 Pa-m3/s
Opto-isolated COM port for Windows OS
Up to 3 TEM Holders
3-Position toggle (Pump-Off-Vent)
7" Touchscreen Control Panel
Qwk-Switch™ Source mounting to transfer to SEM
100-230 VAC, 50/60 Hz, Power consumption 500VA at 50 Ohms
36 x 102 x 51 cm / 40" x 20" x 14" (HxWxD)
6.5" x 6.5" Al chamber w/ Viewport
Weight 120lbs / 55 kg

GV10x Remote Control software v1.7

Recipes for multi-users – 10 roll around recipes stored
Pressure Trigger – enables plasma ignition at selectable pressure
Set and monitor – cleaning Power & Duration

PN#	Mobile Cubic Asher
MCA	Mobile Cubic Asher: • Chamber • GV10x Qwk-Switch™ DS [1]Source • Controller • ibss Software • 60 l/m Scroll Pump w/ Shutoff Valve & MicroPirani
	TEM Holder Sleeves
TEM J	JEOL TEM Holder Sleeve & Plug
TEM F	FEI TEM Holder Sleeve & Plug
TEM H	Hitachi TEM Holder Sleeve & Plug
	Optional SEM Cleaning Items
QS4T	Qwk-Switch Adapter & Plug – One per SEM
SP	[2]Spooler for SEM chamber cleaning – One per SEM to be cleaned
GCR	500 psi Gas Cylinder & Regulator 14.25" x 3.53" Plasma Driving gas

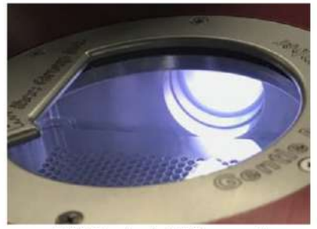
[1]GV10x DS Asher comprised of a patented Plasma Source and Controller
[2] Identify SEM[s] port dimension to select correct spooler
Contact ibss Group for hydrogen cleaning

Prices: FOB Burlingame, CA
Terms: Net 30 Days
Delivery: 6 weeks ARO
Warranty: Three Year Limited

February 2019

Chiaro

Touchscreen Control Panel



UV Protected Viewport

GV10x w/ Qwk-Switch™ fitting for quick shift to SEM[1]
7"x7" chamber w/ 3 TEM holder ports & swing away viewport
Up to 99 Watts at 13.56 MHz RF
80 l/s turbo pump ($1E^{-6}$ Torr base pressure)
Shutoff leakage - $1E^{-8}$ Torr l/s, 1.3E-9 Pa-m3/s
Opto-isolated for SEM protection
7" Touchscreen Panel – Set Power(w), Cleaning Duration, Pressure Trigger
Sequenced ON/Off/Vent toggle
1/8" N_2 vent
100-230 VAC, 50/60 Hz, Power consumption 500VA at 50 Ω
H x W x D: 36 x 102 x 51 cm / 40" x 20" x 14"
Weight: 120 lbs./55 kg

Remote Control software for PC

- Set Power(W) & Time
- Set min/max power limit
- Pressure Trigger
- Recipes
- Logging
- Online Support

PN#	Description
CHV	CHIARO™
	Optional Accessories
TEM J	JEOL TEM Holder Sleeve & Plug
TEM F	FEI TEM Holder Sleeve & Plug
TEM H	Hitachi TEM Holder Sleeve & Plug
OM	Stereo Microscope 104 mm WD, 0.7x mag w/ LED illumination
GCR	58L Cylinder & Regulator (Gasco UN1954) Recomendad Gas Mixtures: N_2/H_2, O_2/Ar or He/H_2

[1]GV10x DS Asher comprised of a patented Plasma Source and Controller
Contact ibss Group for hydrogen cleaning

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Terms: Net 30 Days
Delivery: 8 weeks ARO
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February 2019