

## Solutions for Plasma Ashing

### ENVIRO™ High Speed Plasma Ashing Systems



ENVIRO-1Xa 2C  
Made in the USA



ENVIRO-Optima  
Made in the USA



ENVIRO-1Xa  
Made in the USA

# Solutions for Plasma Ashing

## ENVIRO™

### High Speed Plasma Ashing Systems

- ENVIRO-1Xa – Single Chamber
- ENVIRO-1Xa 2C – Two Chambers
- ENVIRO-Optima – Three Chambers

ENVIRO™ features common process chambers mated to high speed wafer handlers for R&D, pilot production and high-volume manufacturing; including thin wafer handling.

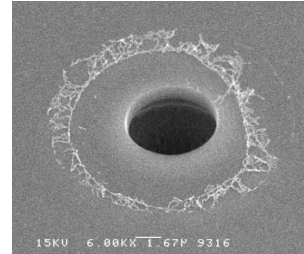
### ENVIRO offers the flexibility for multiple applications, including:

- Bulk ashing (including thick resist such as SU-8, KMPR)
- High Dose Implant resist strip
- Descum
- Polymer and residue removal
- MEMS release (organic sacrificial layer removal)
- Backside ashing, bevel/edge cleaning

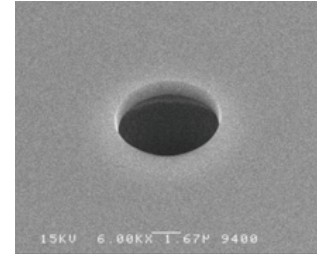
### ENVIRO offers a wide process operating range:

- Ashing Rate – Several nm/min to more than 10  $\mu\text{m}/\text{min}$
- Wide range of stage temperature control (hot plate or optional cold plate)
- Choice of high efficiency downstream plasma sources: ICP or MW
- Choice of RF bias plasma source
- Up to 4 MFC's, 2 standard, 2 optional
- Gas chemistries: Oxidizing, reducing, halogen bearing

### Post Bosch Process Residue Removal



After Conventional Ash Process



After ENVIRO Ash Process

### MEMS Device Descum

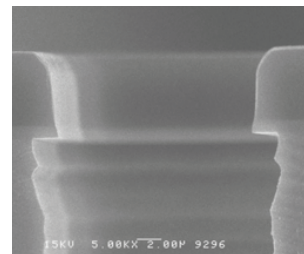


Pre Descum

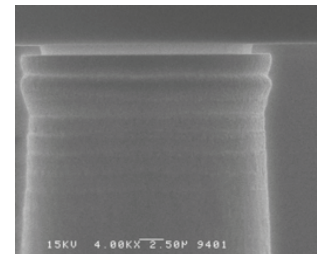


Post Descum

### Post Deep Silicon Etch Resist Removal



Pre Ashing

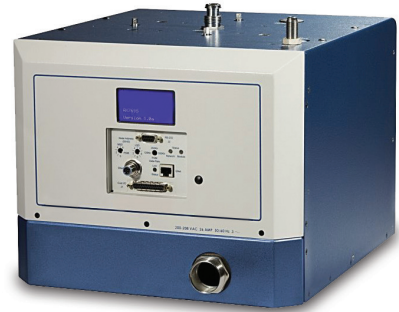


Post Ashing

# Plasma Source Options for ENVIRO

## ICP Source

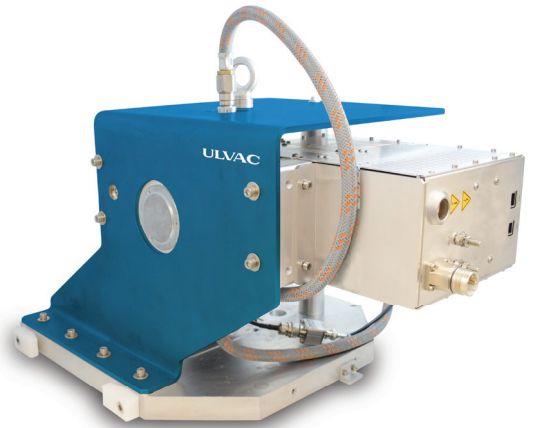
The original Optima was designed for high throughput and high reliability utilizing a compact, inductively coupled plasma (ICP) source. To meet the demands for high productivity, the process focus was on high film removal rates, MEMS applications, and high dose implant strip (HDIS).



## MW Source: Expanded Process Capabilities

With the addition of microwave frequency plasma source technology, the Optima can support a wider range of process chemistries to address low temperature polymer removal and low oxidation of substrate materials. The microwave energy provides low plasma induced damage with test results indicating approximately 50% reduction from the ICP source.

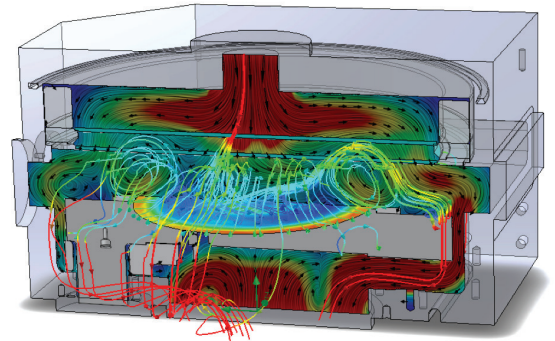
- Wider range of process chemistry
- Low temperature polymer removal
- Low oxidation of substrate materials
- 50% reduction in plasma induced damage



## RF Bias Source: More Expanded Process Capabilities

RF Bias source is the latest addition to Optima's plasma options, which further expands Optima's process capabilities. RF Bias plasma can act on its own, or be used in conjunction with MW or ICP downstream plasma source. Chemical and physical ashing/etching can be achieved at the same time, to address a wider range of processes:

- Carbonized skin layer removal in high dose implant strip
- Anisotropic low temperature descum
- Light etching
- High aspect ratio cleaning



Configured with either Microwave or ICP as downstream plasma option, and RF Bias as an independent plasma option, the Optima continues to support the needs for high volume production with its ability to replace multiple legacy systems with a single Optima tool. ULVAC customers have put into mass production one Optima system to replace from three to seven legacy dry strip systems.

# Solutions for Plasma Ashing

## ENVIRO-Optima™ (3 process chambers)

- 150 – 300 mm wafer size
- 240 WPH mechanical throughput
- Equipment Front End Module (EFEM) with 4 integrated loadport modules – open cassette, SMIF and FOUP compatible
- High throughput in a compact footprint
- Multiple options of plasma sources with a wider range of process chemistries



## About ULVAC Technologies, Inc.

ULVAC Technologies, Inc. is an international corporation that designs and manufactures systems for industrial and research applications utilizing vacuum technology. Our products cover a broad spectrum of markets, including: equipment for the semiconductor, MEMS, solar, flat panel display, automotive, medical, electronics, and refrigeration industries. ULVAC Technologies uses a Class 10 process development laboratory and customer demonstration facility to meet the unique needs of their different markets. ULVAC Technologies is a subsidiary of ULVAC, Inc., which is made up of over 45 companies engaged in most sectors of the vacuum industry.

The company is ISO 9001 and 14001 certified.

**ULVAC**

### ULVAC Technologies, Inc.

401 Griffin Brook Drive  
Methuen, MA 01844  
www.ulvac.com  
sales@ulvac.us.com  
978-686-7550

### ULVAC GmbH

Klausnerring 4, 85551 Kirchheim b.  
München, Germany  
www.ulvac.eu  
ulvac@ulvac.de  
+49-89-96 09 09 0

### ULVAC Singapore Pte Ltd

11 Tampines Street 92, Tampines Biz-Hub  
#02-08, Singapore 528872  
www.ulvac.com.sg  
sales\_usg@ml.ulvac.com  
+65-6542-2700