



Industrial Microwave +
Plasma Systems



MUEGGE DeCap Compact

MA1250D-114BB

Compact Microwave Plasma System for Decapsulation

System Description:

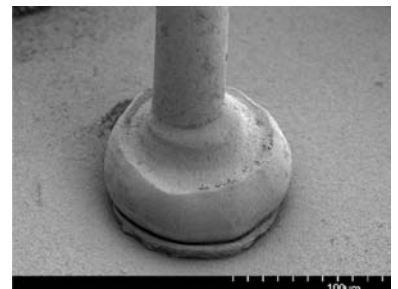
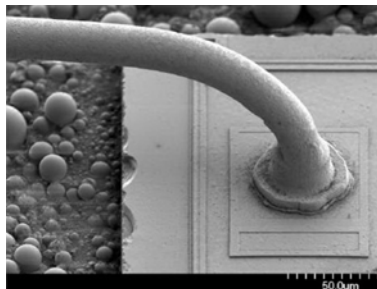
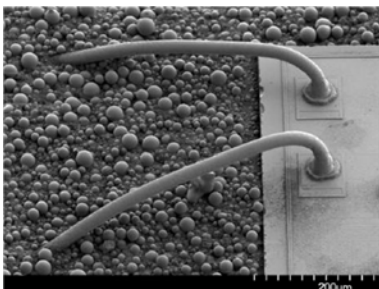
The MUEGGE - *ER³T* plasma decapsulation tool MUEGGE DeCap Compact has been especially developed for the fast etching of mould compound and polyimide to open microchips without attacking the sensitive wiring. In order to enable a failure analysis of capsulated product chips a new plasma enhanced decapsulation process has been introduced.

State-of-the-art process control in combination with microwave plasma generator / source are the key elements of the MUEGGE DeCap Compact.

Starting at very economic prices, the systems range from R&D tools to production medium quantities. It is ideal for small fabs, R&D labs or institutes.

The MUEGGE DeCap Compact Batch Plasma system works with a high selectivity to the passivation, short decapsulation time at gentle process conditions and fast isotropic etching by radicals only.

Decapsulation examples:



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Technology for Plasma Decapsulation:

The **R**apid **R**eactive **R**adical **T**echnology (R3T®), introduced by the **R**emote **P**lasma **S**ource, provides the capability for fast decapsulation of microchips with high selectivity and no attack on metals. The radicals generated by the Remote Plasma Source are creating only a chemical reaction at the surface of the substrates, which leads to a pure chemical etch with an extremely low thermal load and damage free etching at high rates.

Decapsulation Tool MUEGGE DeCap Compact:

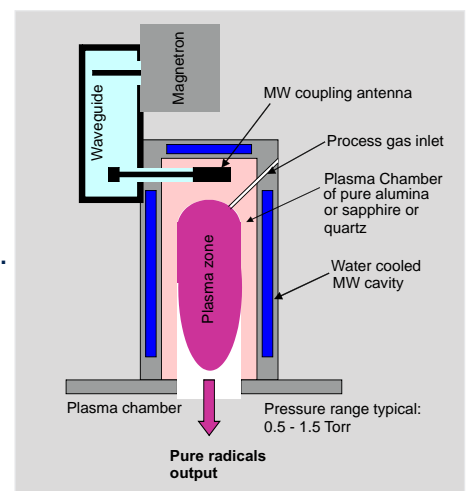
The new MUEGGE DeCap Compact Tool is designed as a **compact table top tool**, built for use in development laboratories or small fabs.

Dimensions: W = 835 mm, L = 840 mm, H = 835 mm
Working area: 240 mm x 240 mm
Peripheral: Vacuum pump (e. g. dry pump 250 m³/h)
Gas cleaning system (e. g. dry absorber)



Key Elements:

- MUEGGE's compact remote microwave plasma source with unique water-cooled plasma zone composed of alumina / sapphire / quartz guarantees **outstanding lifetime** of the plasma chamber
- **High performance at low cost of ownership**
- **High environmental compliance** due to very high dissociation of global warming gases such as CF₄ and NF₃.
- Pure chemical etching with no attack on the etching sample by ions; therefore **high selectivity** is achievable.
- Dense plasma excitation leads to **high amount of radical generation** which is necessary to start the fast etching process.
- Remote plasma for much **less thermal load** in the chamber than conventional plasma
- Ideal for small fabs, R&D labs or Institutes



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Features:

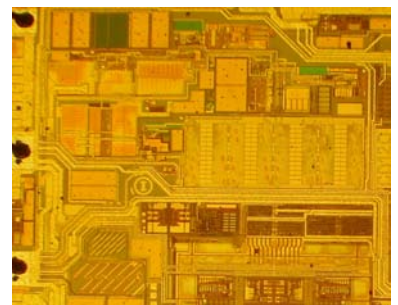
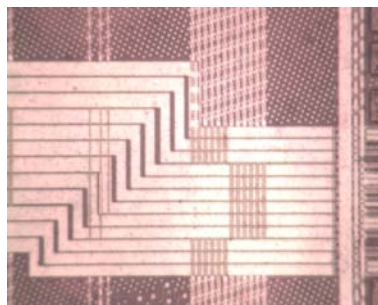
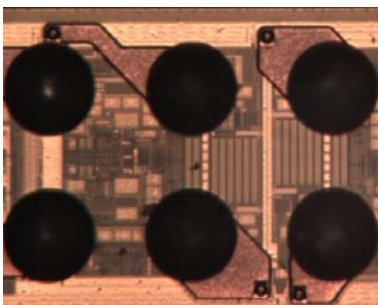
- Compact design
- Very high etch rate (200 $\mu\text{m}/\text{h}$ incl. inorganic materials)
- Etching of silicon and silicon compounds such as SiO_2 and Si_3N_4 and removal of thick epoxy materials
- Cu wires (and Au, Al, or Cu/Pd) are not etched
- Only slight etching of chip passivation (High selectivity > 500:1)
- High environmental compliance due to very high dissociation of greenhouse gases
- Lowest cost of ownership

MUEGGE DeCap Compact etch process - special features:

- Remote high oxygen radical output plasma source, no damage by ions, heat impact only by reaction energy.
- No attack on wiring (e. g. Cu and Pd - Cu materials)
- Low attack of chip passivation (selectivity > 500:1)
- Fast isotropic etching by radicals only
- No ions, no radiation, no electrical fields at sample
- Decapsulation time: 1 - 3 hours typical, after laser ablation
- Field proven

MUEGGE DeCap Compact etch process - options:

- Additional mass flow controllers (MFC)
- Process monitoring software for PC



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Specifications:

INPUT VOLTAGE :	400 V AC, 3 ph, 50 Hz, 3 x 16 A [available for 208 V AC and 480 V AC]	EXTERNAL DIMENSIONS:	W = 835 mm, L = 840 mm, H = 835 mm
HF-POWER:	Max. 1 kW cw, 2450 MHz	DIMENSIONS PROCESS CHAMBER:	W = 260 mm, L = 285 mm, H = 240 mm
COMPRESSED AIR:	Quality: Oil-free, dry, 5 μm filtered Pressure: 6 bar - 9 bar Option: N ₂ 6 bar - 9 bar	CONDITIONS:	Ambient Temp.: 5 °C – 40 °C non-condensing, T _{max.} = 40 °C < 3 h/d, Humidity: 80 % @ 30 °C, subsequently linearly reduced to 50 % @ 40 °C
INPUT GASES; PROCESS PRESSURE:	Oxygen (O ₂), Nitrogen (N ₂), Tetrafluoromethane (CF ₄), (optional two additional gases possible); 0.4 bar - 2.4 bar	COOLING:	Internally air-cooled and water-cooled 10 l/min, 4.5 bar - 6 bar, water inlet temperature 20 °C - 25 °C
WORKING AREA:	Temperature: 30 °C - 70 °C Heating/Cooling Fluid: Water	CONNECTIONS:	Terminals 16 A (MAINS), ½" lock coupling Rectus Series 87 (COOLING WATER), ¼" torque clutch (COMPRESSED AIR), 6 mm Swagelok (INPUT GASES), ISO-K63 (OUTPUT TO VACUUM PUMP), Stud M6 (PE)
ASSEMBLY :	Fully enclosed aluminum housing, Solid encapsulated assembly	STANDARDS:	EN(UL) 61010-1, EN 55011, EN 61000-6-2, Semi S2

Recommended system components:

- Vacuum pump (dry pump min. 250 m³/h)
- Gas cleaning system (dry absorber)

