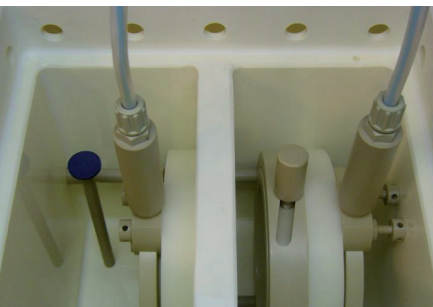
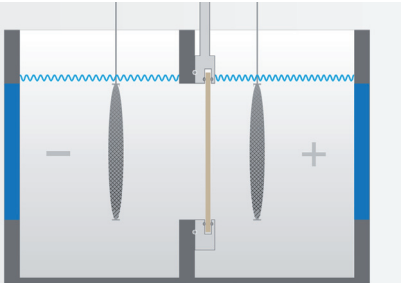


WET ETCHING SYSTEM FOR POROUS SILICON (PSB)

DOUBLE CELL HF-BATH FOR POROUS SILICON FORMATION



Schematic diagram of the PSB double cell wet etching system



The PSB wet etching system for porous silicon is a complete solution for porous silicon formation and electropolishing of silicon wafers. Together with the MEMS Power Supply for Porous Silicon (PS2), an all-in-one solution for this range of fabrication methods is available.

The etching bath is built from welded polypropylene (PP) and holds HF or HF-ethanol solution. For safety reasons, the bath is equipped with connections for continuous HF vapor extraction and is mounted to a surrounding wet bench with threaded bolts. PTFE drain cocks can be connected directly to external HF handling systems or the disposal.

Optionally, two optical windows at the left and right sides of the bath allow light-assisted porous silicon formation. Two HF-resistant sapphire windows, each supported by a thick quartz disk for fracture protection, can be mounted into sealed flanges. If illumination is not required, blind PP covers can be mounted instead.

The wafer is mounted into a removable wafer holder which is sealed with double O-rings. The wafer holder is then placed in front of the circular opening in the separation plate and then fixed in place by a quarter turn of the bayonette catch. When the catch is closed, both HF compartments are electrically isolated within the $k(\Omega)$ -range.

One platinum net electrode is mounted into each side of the tank. In order to achieve a homogeneous electrical field distribution, a PP ring is set in place between the electrode and the wafer. If no liquid contact to the backside of the wafer is desired or if a current gradient across the wafer should be induced, an additional electrical contact may be made to the backside of the wafer by means of a platinum wire ring in the wafer holder.

A variety of different wafer holders is available to suit applications from test and process development to production. The standard, full wafer holder with an edge exclusion zone of 7 mm. The design features include a screwless locking mechanism using a special closing device. A dedicated test wafer holder allows a wafer to be etched in six different positions, while only exposing a small circular area. As such, several test runs can be performed on just one wafer.

The PSB system can be operated in stand-alone mode, or integrated into a wet-bench for industrial or lab use. For industrial use, all valves and the bayonette catch as well may be pneumatically operated. The system can therefore be easily adapted to small-scale production environments.

TECHNICAL SPECIFICATIONS

Product code	PSB 100	PSB 150	PSB 200
Wafer size	100 mm (4") or smaller	150 mm (6") or smaller	200 mm (8") or smaller
Internal dimensions bath			
Width × Height × Depth <i>not equivalent to HF volume</i>	200 × 150 × 180 mm ³	220 × 230 × 225 mm ³	300 × 320 × 400 mm ³
External dimensions			
Width × Height × Depth with vapor extraction	350 × 300 × 270 mm ³	400 × 320 × 430 mm ³ w/o pneumatic opt.	420 × 630 × 530 mm ³
Material	Polypropylene (PP), welded, white		



Product code		PSB 100	PSB 150	PSB 200
Separation plate		This welded PP plate separates the bath into two chambers of equal size and has a circular opening of		
		∅ 98 mm	∅ 140 mm	∅ 188 mm
Electrical isolation between chambers		> 10 ⁵ Ω when bayonette catch is closed with isolating wafer substitute		
Standard Wafer holder				
Edge exclusion area		7 mm	10 mm	9 mm
HF exposed area		86 mm	130 mm	182mm
Electrodes (2)				
Size (diameter)		90 mm	140 mm	190 mm
Distance between wafer and electrode		61 mm	75 mm	82 mm
Material	w/ optical windows	platinum meshed electrode (Pt/Ir) in a PEEK frame		
	w/o optical windows	platinum (Pt) plate in a PEEK frame		
Optical window (optional, Plus system only)				
Size		∅ 93 mm	∅ 130 mm	upon request
Material		1 mm sapphire window backed with quartz disk		
Connections				
Fluidic		two separate drain cock (+GF+ ball valve 546 PPH - DN10) pneumatic actor optional		
Wet bench mounting		welded threaded joints		
Cover		PP cover plate with handle (below vapor extraction)		
Etchant compatibility		HF and HF-ethanol mixtures		
Temperature range		10 °C – 30 °C		

PSB WAFER HOLDERS

Besides regular wafer holders for 2", 3", 4", 5", 6" and 8" wafers we also offer unique wafer holder for the porous silicon system.

» Test wafer holder

The test wafer holder allows to perform up to five etches on a single wafer thus helping to increase the speed of development of a set of parameters.

» Chip holder

Individual chip holders can be manufactured customer specifically for almost any chip size.

OPTIONS

» Silicon electrodes

For processes which have to remain fully free of metal ions the Pt electrodes can be replaced by Si sacrificial electrodes.

» Pneumatic actors

Both, the bayonett catch as well as the drain cocks, can be controlled by pneumatic cylinders

» HF cooling

Tubes inside the HF tanks allow for external cooling of the HF etchant

NOTE: Hydrofluoric acid (HF) is an extremely dangerous substance to work with. Special care has to be taken when installing, maintaining and operating this system. In particular, a secure mount of the device and an appropriate vapor extraction has to be assured. AMMT can provide information about the installation and operation of the PSB, but will not assume any responsibility for harm or damage caused by using this product.