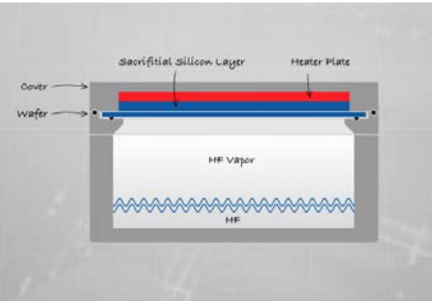
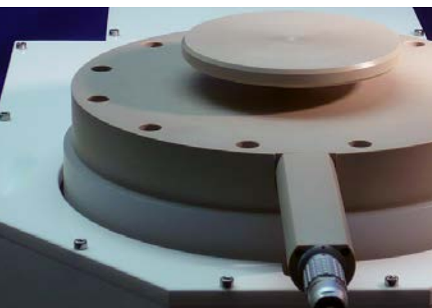
HF VAPOR ETCHER

HFVE SYSTEM

PRODUCT INFORMATION SHEET

Working principle of HF vapor etching





HFVE System with head stage

HF Vapor Etching. Hydrofluoric acid (HF) is an ideal etchant for all silicon oxide types used in micromachining,since it allows fast etch rates and is highly selective against silicon. A typical application for HF etching is the removal of sacrificial oxide layers in MEMS fabrication. However, as is typical for liquid-phase etchants, there is a high risk of the movable structure sticking to the substrate due to the effects of surface tension.

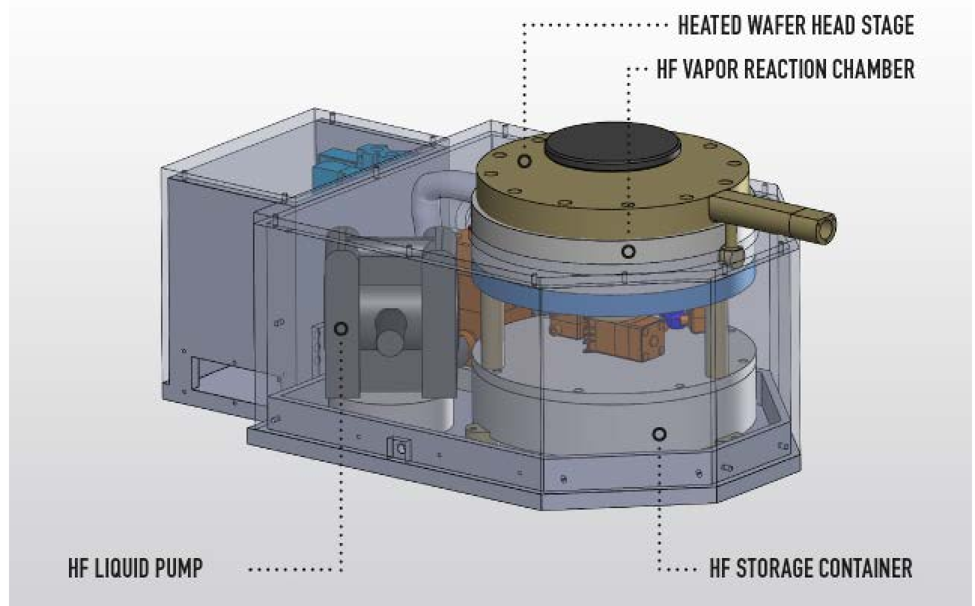
AMMT's HF Vapor Etcher solves this problem by working entirely in the vapor phase, which is a quasi dry process.. The HF Vapor Etcher is perfectly adapted to surface micromachining, SOI-MEMS, dicing-free release, structure thinning, and many other applications.

The wafer is mounted onto the reaction cell with the etching side facing down. HF vapor is generated passively from a small liquid reservoir at the bottom of the reaction cell. The HF vapor reacts with theSiO2 on the wafer surface to form volatile SiF4, which desorbs readily from the surface. The reaction also requires small amounts of water to be present on the surface. In order to ensure a microscopic water film on the surface without producing droplets which could cause sticking, the wafer is gently heated from the backside by an HF-resistant precision heater plate. An excellent etching homogeneity is achieved by our special heater design, which minimizes temperature gradients over the wafer that could affect the etch rate.

HFVE System & process cycle. The HFVE system consists of a reaction cell, a heated wafer holder, and an HF handling system with an HF storage container, in addition to an electronic control unit. The wafer temperature and process duration are set at the control unit.

First the wafer has to be mounted in the wafer holder and placed onto the reaction cell. Once the wafer's temperature has reached the set point, the system automatically pumps HF from the storage container into the reaction cell. After the preset process duration is over, the HF is automatically drained into the storage container and the reaction cell is flushed out with nitrogen.

The wafer can now be removed safely, because the reaction cell is free of HF vapor. The HF can be used for multiple etching cycles.



A.M.M.T

AMMT GmbH — Advanced Micromachining Tools
Anselm-Feuerbach-Strasse 6, 67227 Frankenthal, Germany
Tel.: +49-6233-4960014, Fax:+49-6233-436214
E-Mail: info@ammt.com, http://www.ammt.com

We want to ensure that we have close contact with our customers. If you have any questions or special requirements, please do not hesitate to get in touch with us. This product information sheet is for general information purposes only. The product descriptions and the content of this document are not a substitute for our instructions in the product manual.
Specifications contained in these pages are subject to ongoing change due to progress in research and development. AMMT reserves the right to update or modify any information without notice. This also applies to improvements and/or modifications to the products described herein. AMMT is not subject to any obligations with respect to products or services. AMMT's product information sheets do not contain any representations or warranties. All technical specifications and price information are subject to change without notice.
Copyrights 1997 - 2016 AMMT GmbH. All Rights reserved.

TECHNICAL SPECIFICATIONS

Product code	HFVE System 4	HFVE System 6
Wafer size	4" (100mm) or smaller	6" (150mm) or smaller
External dimensions		
Etcher (width x width x height)	657 x 340 x 288 mm^3	
Base plate (width x width)	580 x 340 mm^2	
Control unit (width x height x depth)	200 x 150 x 200 mm^3	
Materials		
Heater housing and wafer holder Heater HF reaction cell Safety receptacle O-rings	PEEK Fully sealed aluminum heater with silicon cover PP PP wellded Viton	
Etchant volume	350 ml	
Etchant compatibility	HF 50% or less and mixtures of HF and organic solvents	
Temperature control		
Heater type	Resistive heater, fully HF protected	
Heater power	60 W max.	
Heater power supply	110 - 230 V, 60 VA, 48-63 Hz	
Temperature range	Room temperature to 60°C	
Temperature sensors	Pt100 (one embedded heater, one in the main unit)	
Temperature controller	Electronic PID controller with differential temperature measurement and PWM output	
User parameters	Process duration, Wafer temperature Nitrogen preflush time, Nitrogen endflush time	
Mode of operation	absolute temperature / relative temperature in respect to room temperature	
Required supplies		
Nitrogen	[6 .. 7 bar]	
Vapor exhaust	acid proof, flow min. 30m/min	

OPTIONS

For dicing free release applications a HF proof mesh is available.
For small chips an electrostatic chuck is available.

HFVE electrostatic chuck

HFVE System electronic control unit

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 for the device and an appropriate vapor extraction **must be secured**. AMMT can provide information about the installation and operation of the HFVE system, but will not assume any responsibility for harm or damage caused by using this product.