

Hydrofluoric Acid Vapor Etcher

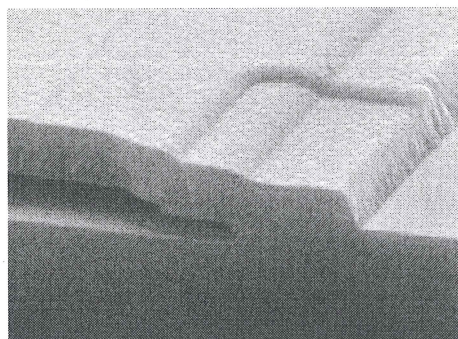
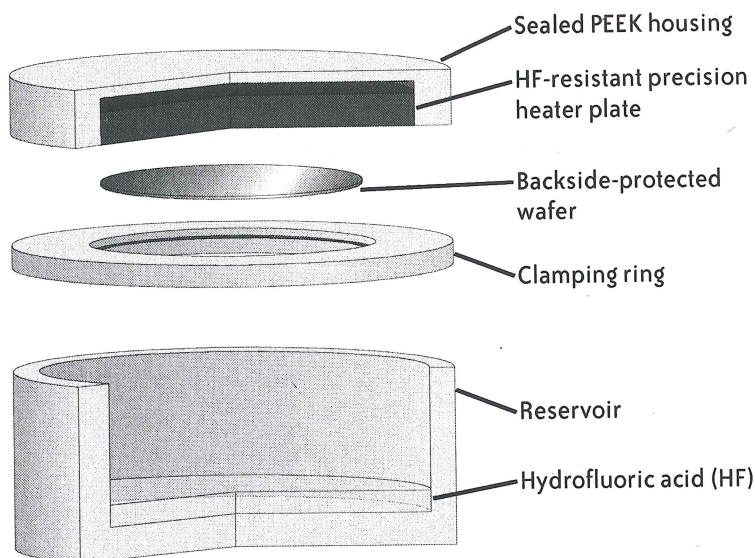
Preliminary product information

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

AMMT's HF Vapor Etcher, developed in collaboration with the Institute of Microtechnology at the University of Neuchâtel in Switzerland, resolves this problem by working entirely in the vapor phase. HF vapor is generated passively from a small liquid reservoir assuring a small footprint of the system. 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 reservoir with the etching side facing down. The HF vapor reacts with the SiO_2 on the wafer surface to form volatile SiF_4 , which desorbs readily from the surface. The reaction also requires water to be present on the surface in small amounts. In order to assure 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 reduces temperature gradients over the wafer that could affect the etch rate.

Safety is an important issue when working with HF. AMMT's engineers have designed this easy-to-use etching system with a maximum of security including a latching mechanism to hold the components of the etcher in place and a safety receptacle around the etcher in case of spillage.



Polysilicon membrane of a surface-micromachined pressure sensor. The cavity underneath the membrane has been fabricated by selective removal of an TEOS silicon oxide layer. The membrane is fully released and does not stick to the substrate after the etching process.

Technical specifications

Product code	HF Vapor Etcher 4	HF Vapor Etcher 4
Wafer sizes available	4"/100 mm	6"/150 mm
Wafer holder	<ul style="list-style-type: none"> • Single wafer holder • O-ring seal width: 1.8 mm • Edge exclusion: 7 mm • Active area diam.: 86 mm • Larger active area optional 	<ul style="list-style-type: none"> • Single wafer holder • O-ring seal width: 2.3 mm • Edge exclusion: 10 mm • Active area diam.: 130 mm • Larger active area optional
Heater plate	HF-resistant, resistively heated, temperature range: room temperature to 40 °C, external PID-controller for temperature regulation	
HF Reservoir volume	max. 200 mL	
External dimensions Width x height x depth (including safety receptacle)	370 x 370 x 250 mm ³	
Safety	All components of the system are latched when assembled for mechanical stability. During operation, the etcher is sealed and the HF vapor is confined to the reaction chamber. An external safety receptacle holds HF in case of spillage during filling.	
Material	Poly ether ether ketone (PEEK) and welded polypropylene (PP)	
Etchant compatibility	HF and mixtures of HF and organic solvents	
Temperature range	10 °C – 40 °C	

Note: HF is an extremely dangerous substance. 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 vapor etcher, but will not assume any responsibility for harm or damage caused by using this product.

Note: AMMT manufactures the HF vapor etcher for all wafer sizes. Please inquire for specifications and prices.

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