DISCO

Kiru · Kezuru · Migaku Technologies

Fully Automatic Dry Etcher

DFE8040/8060

Realizes distinct dimensional die strength based on the side-etching effect

Stress relief using dry etching

The DFE8040/8060 is a stress relief machine that uses dry etching based on fluoride gas plasma. By removing the grinding damage layer from the wafer backside, there is a decline in wafer breakage, improvement in die strength and reduction in warpage. As a result, it improves the production yield in the packaging process. In addition, because it is a complete dry process, chemical penetration or contamination does not occur. Also, since it is a no-load process, dry etching is suitable for fragile devices.

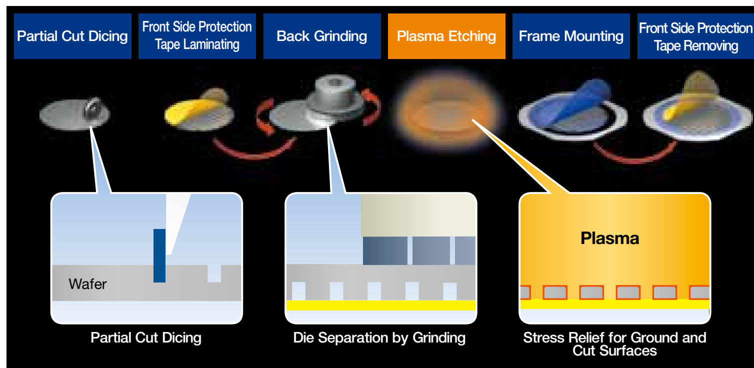
In combination with the DBG process, there is a further die strength improvement

If the DBG process is combined with the dry etching, in addition to removing the grinding damage layer from the wafer backside, removal of the cutting damage from dicing is also achieved due to side-etching effect. Compared to the stress relief of just the wafer backside, DBG processing with dry etching secures greater die strength.

DFE8060

DFG8560

DBG (Dicing Before Grinding) + Dry Etching Process Flow



Fully Automatic Dry Etcher
DFE8040/8060

Improve product yield with the in-line system

The use of this machine is premised on the in-line specification with the DISCO DFG8560, DFG8540 or DGP8761 grinder. It is also possible to use in-line with the DFM2700 or DFM2800 multifunction wafer mounter.

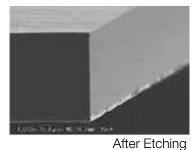
Able to process rough surfaces to improve the adhesion of backside electrode

By conditioning the process surface before etching, it is possible to roughen the plane roughness while it is clean. As a result of this, adhesion improvement of the metallization layer and reduction of Ohmic resistance* can be expected for backside electrode formation

Safe Design

SF_6 gas, which is harmless to humans, is used and the very slight harmful gas generated can be removed by separate abatement facilities (customer's facilities). In the inherently dangerous parts of the machine, interlocks are used to ensure safety. Also, the machine structure conforms to EU machine protocols and EMC protocols.

Before Etching


After Etching

*Ohmic Resistance: Is the sum of the contact resistance between materials and material specific resistance. Reduction of Ohm Resistance is important in the case of power MOS and other devices. The lower the resistance, the more ability there is to control the power loss at the time of device operation. Also, a higher current can pass through the device.

DFE8040/8060 Specifications

			DFE8040	DFE8060
Wafer Diameter			ø8"	ø8" or ø12"
Processing Method			High-density, high-pressure, narrow-gap plasma	
Treatment gas used			SF_6/He/N_2	
Wafer transport section	No. of cassettes		2	
	Cassette section wafer flow		Open flow (Storage only)	
	Transfer arm		• Transports wafers from the spinner table of the grinder to the chuck table in the chamber. • Transports etched wafers from the chuck table in the chamber to the dummy table.	
	Dummy table		Table onto which etched wafers are transported by the transfer arm before they are unloaded into the cassette by the robot.	
	Robot		Transports etched wafers from the dummy table to the cassette.	
	Cassette stage		Plate on which a cassette to store etched wafers is placed.	
	Cassette used		DBG cassette only	
Utility Unit	Dry-pump		Used to exhaust the chamber. *The recommended overhaul interval is 12 months.	
	Exhaust velocity	m^3/h	27	
	Ultimate pressure	Pa	10 abs	
	Rotary pump		Used to vacuum the chuck table. *The recommended overhaul interval is 12 months.	
	Exhaust velocity	m^3/h	5.8	
	Ultimate pressure	Pa	0.2 abs	
	RF power		High-frequency power used for plasma generation	
	Mass flow controller		Regulates supply gas flow.	
	Valves		Used for etching section/utility gas section operation control.	
	Gas detector		Detects HF leakage from the machine/utility unit. * It is recommended that the break monitor is calibrated once in half a year.	
Coolant Unit			(2: one for cooling the upper electrode and the other for cooling the lower electrode) * The below specifications show the values for one unit.	
	Temperature set up range	°C	+5 ~ +35	
	Max. flow	L/min	15	12
	Max. pumping pressure	MPa	0.42	
	Cooling capacity	kW	2.41 (water temperature set at 20 °C)	3.5 (water temperature set at 20 °C)
	Water used		Deionized water	
Utilities	Electricity			
	Power supply		200 V AC±10 %, 3-phase (50/60 Hz) For other than the above voltages, a transformer is necessary	
	Power consumption	kW	5.0 (during plasma generation) 3.4 (during standby)	7.0 (during plasma generation) 4.0 (during standby)
			*The above values are reference values. They may vary depending on the operating conditions.	
	Maximum power	kVA	17	25
	Treatment Gas			
	Gas used		SF_6 : 99.99% or higher in purity, He : 99.99% or higher in purity	
	Pressure reducer	Mpa	0.1 Variation: 0.03 at Max. *The pressure regulator and the gas filter should be furnished by the user.	
	Purge Gas			
	Gas used		N_2	
	Supply pressure	MPa	Range: 0.5 to 0.8, Variation: 0.03	
	For chamber			
	Flow rate	L/min	50 or higher	
	Consumption per wafer	L	6 *Provided that the purge time is 7 sec. and the wafer processing time is 60 sec. per wafer	

			DFE8040	DFE8060
	For dry pump			
	Flow rate	L/min	1.5	
	Consumption per wafer	L	1.5 *Provided that wafer processing time per wafer is 60 sec.	
Air Supply pressure		MPa	Range: 0.5 ~ 0.8, Variation: 0.03 Max.	
	Flow rate	L/min(ANR)	400 or higher	
Water			Water used for cooling electrodes:	
	Coolant water (Coolant unit)	L	10 ~ 15 (Total of two coolant units) *Water is circularly used. Supply deionized water as needed.	
Air Exhaust				
	Machine main body exhaust system:			
	Function		Detect gas leakage inside the machine. *This system prevents harmful gases from leaking outside of the machine when abnormality occurs in the machine or the process.	
	Exhaust capacity	m^3/min	4 or higher *at the exhaust duct hose connection port of the machine main body when static pressure is as below mentioned.	
	Static pressure	Pa	- 1200 to -130 (at the exhaust duct hose connection port of the machine main body)	
	Utility unit exhaust system:			
	Function		Detect gas leakage inside the utility unit and exhaust heat.	
	Exhaust capacity	m^3/min	7 or higher (at the exhaust duct hose connection port of the machine main body when static pressure is as below mentioned)	
	Static pressure	Pa	-1200 ~ -100 (at the exhaust duct hose connection port of the machine main body)	
	Process gas exhaust system:			
	Function		Exhaust gases after processing * This system expels gases generated in the etching process after they pass through the gas filter. Unused SF6 is included in the gases.	
	Exhaust capacity	m^3/min	0.6 or higher	
	Static pressure	Pa	-1,200 ~ -45 (at the exhaust duct hose connection port of the machine main body)	
Machine Dimensions (W x D x H)				
	Main body		1,400 x 2,500 x 1,800 (excluding the status indicator (324 mm) and other protrusions)	
	Utility unit		775 x 942 x 1,525	
	Coolant unit (2)		413 x 610 x 664 (per unit)	540 x 743 x 772 (per unit)
Machine Weight				
	Main body	kg	About 870	About 1,048
	Utility unit	kg	About 230	
	Coolant unit (2)		About 90 x 2	About 130 x 2

Environmental conditions

- Use clean, oil-free air at a dew point of -15 °C or less. (Use a residual oil: 0.1 ppm. Filtration rating: 0.01 µm/99.5 % or more).
- Keep room temperature fluctuations within ±1 °C of the set value. (Set value should be between 20 ~ 25 °C).
- The machines should be used in an environment, free from external vibration. Do not install machine near a ventilation opening, heat generation equipment or oil mist generating parts.
- Be sure to use compressed air as the main air and sub air sources.
- Residual gas exhausted from the machine after etching contains such toxic substances as HF, SiF_4, SOF_2 and SF_6. Follow the environmental protection codes of the area the machine is installed for control/disposal of such substances.
- In case of water leakage, please install the machine on the floor with sufficient waterproofing and drainage treatments.
- Please install a gas leakage detector at the plant (at the customer side) as well.
- You must wear a gas mask when performing maintenance work. Make sure to have one ready.
- Please prepare emergency plans to deal with accidents.

*** All pressures specified above are gauge pressures.**
*** As the above specification may change due to technical modifications. Please confirm when placing your order.**
*** For further information, please contact your local sales representative.**

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