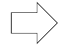
01 Cleaning test for contamination control in wafer shaping process

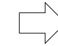
1. The need for precise cleaning in the wafer shaping process

* Image source : siltronic, SKSiltron

Slicing(wire sawing)



Lapping



Etching

The sources of sawing contamination are inorganic and organic substances, and silicon abrasives generated during cutting and metal materials (iron, copper, zinc, etc.) separated from the wire are embedded in a large amount on the cutting surface, and some penetrate into the wafer. In particular, complete cleaning is required to minimize transfer of these metal components to subsequent processes.

After lapping, complete removal is required by combining the slurry (abrasive; mainly Al_2O_3, SiO_2, ZrO_2 etc.) with non-organic substances such as water-soluble oil, abrasive powder (Si particles), and metal components. When introduced to (Etching), it may cause not only bulk metal contamination, but also an increase in etching defects and unevenness of the etching surface.

When a clean wafer is introduced after lapping, contamination of the etching bath and the absolute amount of metal in the etchant are minimized, reducing bulk metal.

2. Sawed & Lapped wafer cleaning test

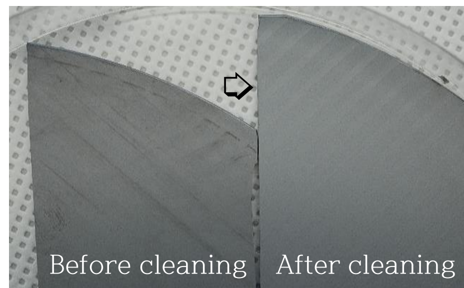
<Conditions for wafer cleaning test>

Cleaning agent used: ECOS-SiCLN 25% solution (pH:8.5)

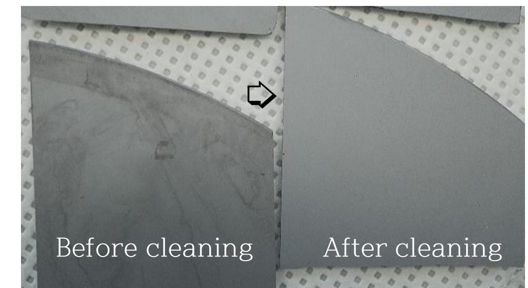
1) Immersion temperature and time: 100℃ /10min

2) Ultrasonic cleaning (DIW): 5 minutes

** In case of actual application, the cleaning conditions are may vary



△ Comparison of appearance before and after sawed wafer cleaning



△ Comparison of appearance before and after lapped wafer cleaning

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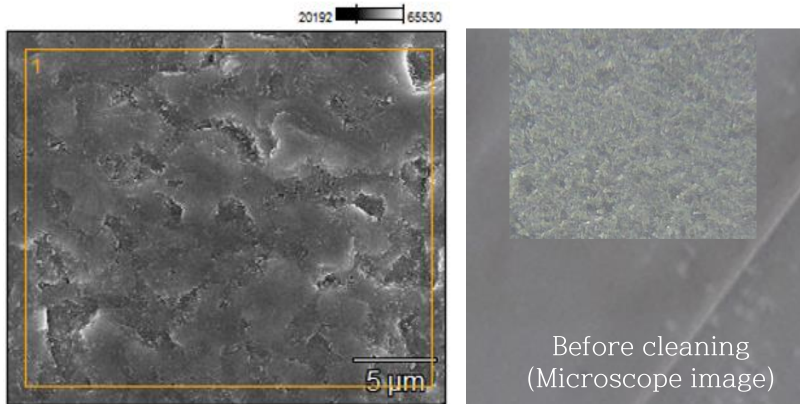
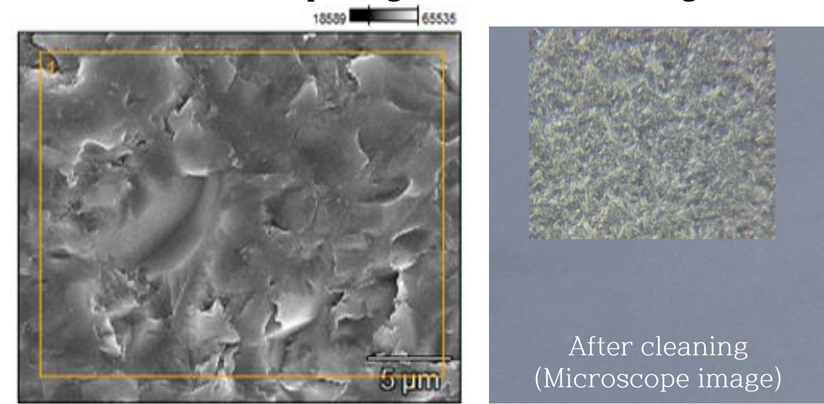
Evaluation of sawed wafer before and after cleaning

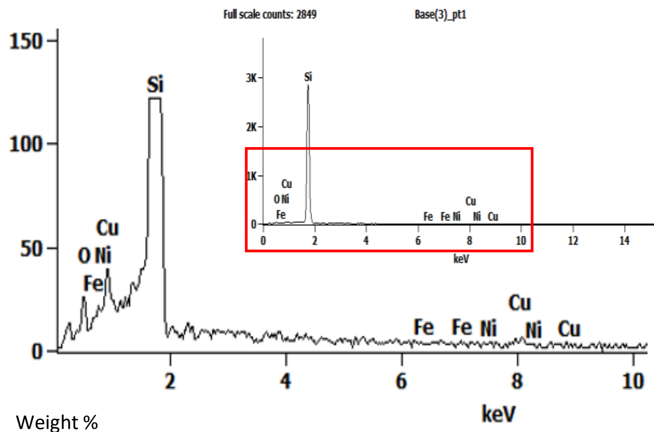
3. SEM mage & EDX analysis results before and after sawed wafer cleaning

◌ SEM & microscope images after ingot wire sawing



◌ SEM & microscopeimage after SiCLN cleaning

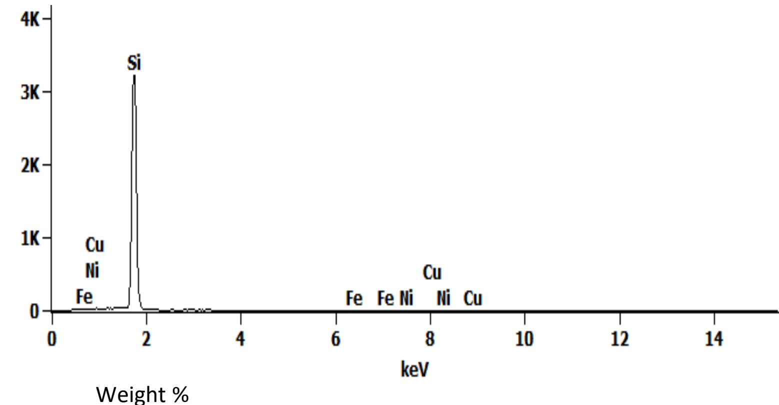




Weight %

	O-K	Si-K	Fe-K	Ni-K	Cu-L
Base(3)_pt1	2.59	95.91	0.00	0.18	1.33

△ Before cleaning: Cu and Ni peaks are measured (A large amount of foreign matter accumulation is confirmed between the surface gaps on the image)



Weight %

	Si-K	Fe-K	Ni-K	Cu-L
Base(4)_pt1	100.00	0.00	0.00	0.00

△ After cleaning: Cu , Ni not detected(However, bulk metal measurement is required)

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