nanotools scanning probes

The Benchmark in AFM Metrology: NanoTOOLS High-End Scanning Probes

Nanotools offers a wide range of scanning probes for inline metrology. With these tips, nanotools can already satisfy the requirements of 65 nm nodes.

AFM Metrology for Next-Generation Lithography: 65 nm, 55 nm, and Beyond

As carbon nanotubes couldn't meet the industry's expectations, current scanning-probe technology seemed to end at around 90 nm feature size. However, demands from metrology are high, i.e., roughness and feature shape measurements at shrinking scales have become more important.

In fact, AFM is a promising metrology tool. But another fact is that technology isn't stumped yet – NanoTOOLS can provide the requested scanning probes with aspect ratios of up to 1:40. These probes are used successfully in leading fabs at 90 nm production. But tips for 65 nm and even 55 nm applications are being tested by R&D teams. So the future lithographical nodes are ensured by NanoTOOLS' probes with dimensions down to 10 nm in diameter.

Shifting to 110 nm at 300 mm? Inline Process Control

The important goal of yield management in wafer processing depends on reliable and high-throughput AFM metrology. This can be achieved more effectively with the help of NanoTOOLS' high-density carbon probes, with their outperforming tip lifetime and resolution at various applications. A few of these applications include etch and filling monitoring in context with trenches or STI, and resist patterns with their sidewall geometries, whereas fine structures at a trench bottom and polysilicon roughnesses are important in polysilicon, wafer milling, or CMP. Another crucial application is critical dimension control in mask and wafer production. Moreover, it's a diamond-like tip, so it withstands almost all etch chemistry used in wafer processing. The probe's extreme aspect ratio and hardness allow reliable measurements of very deep trenches routinely and in high numbers at an inline-production-tool level.

Reduced Total Cost

Direct cost reductions are achieved by a 100 percent yield, as every tip is inspected and its quality guaranteed. Furthermore, the diamond-hard carbon modification makes the tip resistant against all dry- and wet-etch chemicals. Because of that, and because of the non-brittle hardness of the material, the probe has a longer lifetime than other sensors made out of Si, hard metal, or FIB.

This increased lifetime permits more scans per tip, makes fewer tip exchanges necessary and, in the end, leads to a higher wafer throughput per hour. And the properties of the material lead to improved reliabilty of the tip, reducing the number of checking operations.

Industrial Experience Affirms the Statements

- **The lifetime of a NanoTOOLS probe** on freshly etched polysilicon proved to be five times that of a comparable Si tip. A customer in Japan looked upon this experience very favorably.
- **Ramp-up:** A significant gain in precision and yield is reported by a new technology leading DRAM manufacturer after changing over to 300 mm wafer combined with 110 nm technology.
- **7 µm trench control** in the process instead of the costly cross section SEM was successfully implemented by a well-known French customer.
- **NanoTOOLS probes** are now used for final tests on ultraflat 13 nm EUV-lithography mirror systems by a leading German wafer stepper company.
- **Reduction of direct costs** of as much as 18 percent are reported by a Taiwan-based fab after the exchange of Si probes for NanoTOOLS tips.

Nanotools´ 7 µm trench control scanning probe

Contact

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