Pattern Verification for the Sub-20nm Era

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ABSTRACT

The industry has converged on EUV lithography as the most promising candidate to replace ArF for the 22nm half-pitch node and beyond. Alternatively, ML2 is being pursued as a more cost-effective solution, especially for smaller wafer volumes and prototyping.

Both technologies have their individual approaches and problems when it comes to mask and wafer inspection. ML2 however has the added complexity, that the ultimate pattern verification step, patterned mask inspection in D:Db mode is not possible.

A new approach and flow is needed.

At the same time, optical/DUV based Wafer Inspection is running out of resolution, just like DUV based lithography.

A promising new candidate is Electron Beam based Wafer Inspection. While it certainly has the resolution, and is a long proven technology, throughput is in general considered an issue.

In this talk we will summarize the studies and present results of developing solutions to EB based Wafer and Mask Inspection. We will take a special look at the requirements for pattern verification, the resolution and throughput needs, and the technological answers to these challenges. We will investigate the options for EB2M applications, and the sensitivities that can be achieved. The various configuration options for multi-beam approaches will be discussed.

In a final assessment we will look at the economics of MBEBI for wafer and masks, and the possible transparency of these inspections in both EUV and ML2.