

High speed optical inspection of wafers

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Abstract:

The broadband plasma patterned wafer defect inspection systems enable wafer-level discovery of yield-critical defects and inline monitoring for advanced logic and leading-edge memory design nodes. We will address the application of optical wafer inspection and its image capture methodology, including difference image generation, sub-resolution sensitivity and speed. We will introduce the broadband plasma inspection system and its role in chip manufacturing and provide some details on how our core technologies – broadband plasma light source, optics, sensors, algos – enable detection of small defects at speeds required for production as well. We will touch on challenges associated with differentiating between critical defects and irrelevant ones, maintaining defect sensitivity as pattern feature and respective defect sizes continue to decrease, and scaling of wafer noise originated from three-dimensional pattern irregularities like surface and line edge roughness. We will discuss the dependence of defect contrast on film stack geometry and materials, the need of optical constants notion for modeling of the defect sensitivity. The advantages of the use of broadband light for maximizing defect signal and for reducing wafer noise will be addressed as well.