An Effective, Low-Cost Approach to PhotoCell Monitoring for 65nm Node Technologies and Beyond: Darkfield Inspection

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Maintaining statistical defect control of Photolithography tools can be very challenging and costly in diverse waferfabs using a wide variety of photoresists across multiple technology nodes. Although there are several approaches to monitoring Photolithography tool processing performance, TI KFAB uses short-flow monitor wafers that process only through the Photo loop. Traditionally called Photo Cell Monitors (PCM), these monitor wafers have the overwhelming majority of their processing performed in the Photo module at near-process conditions. At many fabs, the PCM wafers usually receive a high-sensitivity, low-throughput brightfield inspection. But because of improved sensitivities and higher throughput capabilities, darkfield inspection allows greater penetration across a wider spectrum of resist-develop cup combinations. This paper shows the advantages of using a low-COO, high-throughput darkfield inspection tool for PCM's in place of a high-COO, low-th!
roughput brightfield inspection tool. It shows sensitivity comparison data across several layer inspections at 65nm technologies and above and covers a few of the issues encountered. Other lessons learned for an effective darkfield PCM program are also discussed. After data analysis is complete, the data shows that darkfield PCM inspections are an effective, low-cost alternative to brightfield inspections for a successful PCM program.