Advanced Trace Analytic Improves Root Cause Analysis for Yield Improvement, Tom Ho

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Motivation

With mature technology, yield improvement is now in the "high hanging fruit" region. The so-called "low" yielding wafers are perhaps within a few percent from the average yielding wafers. The root causes for these low yield wafers are subtle requiring a more in depth analysis of the process parameters. This means a more advanced and comprehensive analysis of the process trace data is needed.

Approach

Traditional FDC solution only collects simple summaries from process traces such average, minimum, maximum values at certain recipe steps. This approach often misses many subtle but important information of the process traces such glitches, ramp rate, noise, shift, and drift to name a few. An advanced process trace analysis couple with a data mining tool on a fab-wide FDC system can provide a deep insight into finding the root cause of low yield wafers. Our advanced trace analytic analyzes the complete traces. It detects and captures many subtleties in the process traces that may affect the quality of the process wafers. Well design process data collection scheme couple with a robust data infrastructure would reduce time to find the root cause. However, as long as process trace data are collected and wafer quality measurements (ie metrology, WET, sort yield) are available, the advanced process trace analysis can be done.

Results

With the appropriate data collection scheme via a FDC system, a robust data infrastructure, and an advanced analysis of process trace data, root cause analysis for low yield wafers can be done in minutes and hours, instead of days or weeks. Root causes can be identified and isolated down to a process trace data of a sub-step of a process recipe. Some sample use cases will be presented.

Examples of trace anomalies