

New Contamination Monitoring Applications Available with Automated VPD ICP-MS

The importance of metal contamination in semiconductor processing and the ultimate yield effects has long been understood in the fab. One particular method used to measure metallic contamination is Vapor Phase Decomposition (VPD) in combination with Inductively Coupled Plasma Mass Spectrometry (ICP-MS). With this technique low detection limits (10^7 atoms/cm²) can be obtained for metals across the periodic table. A new application available now at Balazs is the application of an automated VPD system that automates the VPD process while also allowing additional applications to find and localize contamination and possible sources.

One particular application now available is the analysis of the wafer edge area. The International Technology Roadmap for Semiconductors (ITRS) has identified the edge area as important for contamination with comments such as:

- “Wafer edges were identified to show significant impact on yield...”
- “Defects and process problems around wafer edge and wafer bevel are identified to cause yield loss”
- “The issues of particles and defects which are located not only at the front surface of a wafer but also at wafer bevel/edge portion and backside surface needs to be addressed”

These statements highlight the need; however analysis of just this edge area is not straight forward with traditional techniques. With the application of automated VPD, Balazs can perform analysis of both the inner area of the wafer as well as simply the edge area of a wafer. A depiction of these areas is shown in Figure 1 below.

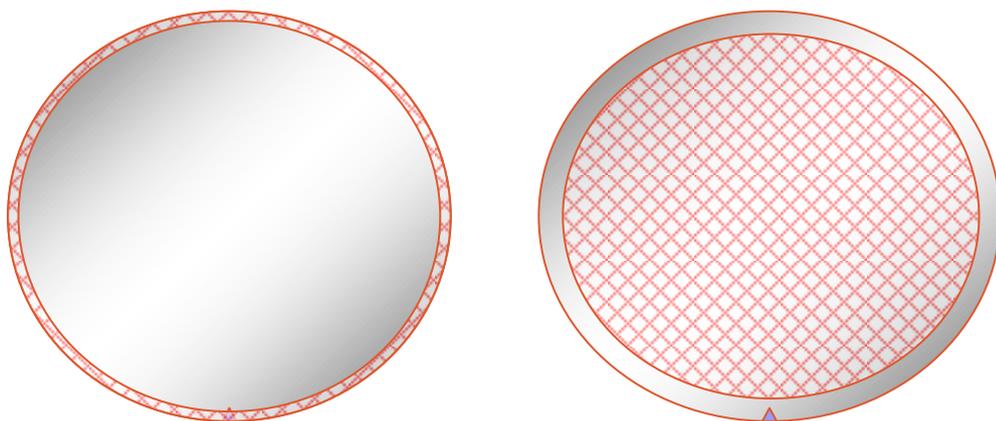


Figure 1: Cross-hatched areas show areas where VPD takes place. On the left, the edge can be analyzed by itself with automated VPD whereas on the right an inner area (or entire wafer) can be analyzed.

Sources of edge contamination can be from wafer chucks or transfer tools that contact the wafer at the edge or from Moreover, the use of automated VPD allows analysis with different edge-exclusion dimensions which is important in establishing wafer cleanliness versus fab specifications.

Additional applications available with automated VPD include analysis of different regions such as quadrants or radial areas of a wafer. Analysis in this manner allows determination of metal contamination that may be traceable to specific tools or contact points with a wafer.

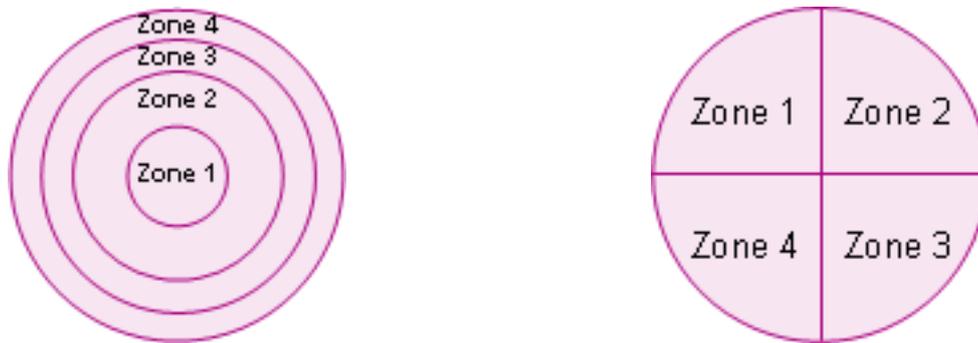


Figure 2: Automated VPD allows specific analysis of different zones, whether radial as in the wafer picture on the left or specific quadrants in the picture on the right. Contamination in certain areas can be traceable to specific tools or process points.

The extension of VPD wafer prep to an automated system allows Balazs and customers to find specific sources that otherwise are grouped with full wafer analysis results. Balazs remains at the forefront of contamination problem solutions at the lowest detection limits and most enhanced applications for the newest processes.

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