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Mobility of Metallic Contamination

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Overview

In wafer test there are several sources of metallic contamination. These metallic contaminates have the potential of being transferred to uncontaminated product wafers. Theoretically they then pose a risk to fab processes if the wafers are reprocessed for any reason. Control of contamination mobility by product segregation, duplicate probe card purchases for contaminated and uncontaminated product, and other similar global process control approaches are expensive. How does contamination get transferred in the probe process and is there a better way to contain it?

This poster describes the results of an experiment intended to quantify where in the probe process contamination protocols should be implemented and where they could be relaxed or eliminated.

DOE Factors

- Contaminates
  - Sodium
  - Gold
  - Copper
  - Silver
  - Tin
- Probe cards
  - Cantilever
  - Vertical
  - MEMs
- Transfer Vehicles
  - Personnel
  - Prober Chucks
  - Wafer Cassettes
  - Wafer Washers
  - PC Metrology
  - Probe Cards
  - Lasers

‘Some’ DOE Results

- Gold
  - PC metrology cleaning plates did not transmit gold to clean probe cards
  - Gold PC metrology Cres plates did transmit gold to probe cards
  - The wafer washer did not transfer gold
- Copper
  - Copper was insidious in its ability to contaminate any probe card
  - It could not be removed from the card
  - Similar to gold copper is not transmitted by PC metrology cleaning plates
  - Copper contaminated the wafer washers but could be removed with a single rinse cycle
- Sodium
  - In all instances where an operator was involved the sodium from the operator masked any sodium transfer from a sodium contaminated wafer to a clean wafer.
  - The wafer washer was very effective in removing sodium.
- Other Considerations
  - In all cases the capability to transfer contaminate was measured with a single control wafer and a single clean wafer due to the number of factors in the experiment.
  - Prober contamination occurred but was resolved with a wipe down in all cases.
  - Many probe card technologies contain potential contaminates within their metallurgies.