The Sandia SUMMIT Process

Sandia's SUMMiT V

- SUMMiT V: "Sandia Ultra-planar Multi-level MEMS Technology 5" fabrication process
  - Five-layer polysilicon surface micromachining process
  - One electrical interconnect layer & 4 mechanical layers
  - Uses chemical mechanical polishing (CMP) to maintain planarity as more structural layers are realized
  - 14 masks

SUMMiT V Layer Stack

- Uses chemical mechanical polishing (CMP) to maintain planarity as more structural layers are realized

Chemical Mechanical Polishing (CMP)

- Used to planarize the top surface of a semiconductor wafer or other substrate
- Uses an abrasive and corrosive chemical slurry (i.e., a colloid) in conjunction with a polishing pad
  - Wafer and pad are pressed together
  - Polishing head is rotated with different axes of rotation (i.e., non-concentric) to randomize the polishing

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CMP: Not the Same as Lapping

Lapping

- Lapping is merely the removal of material to flatten a surface without selectivity
- Everything is removed at approximately the same rate

Removes diff. materials at same rate

Lapping

Chemical Mechanical Polishing

- CMP is selective to certain films, and not selective to others

Stops at non-selective layer

CMP

Actual SUMMiT Cross-Section

MMPOLY4
MMPOLY3
MMPOLY2
MMPOLY1
MMPOLY0

- No CMP until after the first three polySi layers
- 1 μm mmpoly1 and 1.5 μm mmpoly2 can be combined to form a 2.5 μm polysilicon film
- Refer to the SUMMiT V manual (one of your handouts) for more detailed information on masks and layout instructions

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