Interconnect-Electrode Interface Break-out Group

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IC-Electrode Interface Objective

- **Provide and maintain stable electrical conduction paths between interconnect and electrodes**

Status & Challenges

- **Electrical conduction path resistance**
- **Chemical compatibility**
  - Electrode
  - Interconnect & IC oxide layer
- **Mechanical & Electrical integrity of contact**
  - Non-bonded contact (sliding interface)
  - Bonded contact (rigid, flexible, self-healing)

Integration! Integration!

Chemical Compatibility

- Gas & solid phase effects
- Insulating phase growth
- Contamination of electrode/TPB
- Influence of IC oxide composition and growth rate

Development Needs

- Stress analysis of generic contact systems
- Detailed & Parametric Analyses - FEA
- Systems solution – INTEGRATION!
- Non-migrating Silver-like material
- Wonder Contact Material – Fu Fu Dust
- ASAP!
- $ ↓

Approaches

- Non-bonded/sliding contact
- Structurally Robust
- Flexible Contact
- Self-Healing Contact

Non-Bonded Interface

- **Contact quality**
  - Conductivity
  - Surface roughness
  - Area
  - Roughness & area change w/IC oxide growth
- **Uniformity of contact pressure**
  - Stack design governs
- **Creep & thermal cycle degradation effects**
  - Decreased contact area and pressure

Structurally Robust

- Maintain compressive stresses
- Pre-stressed – compressive residual stress
- Thin joints < t_c

Flexible Contact

- Compliance in contact material
- Compliance in interconnect

Self-Healing Contact Matl

- **Fracture Zone Location**
  - @ Electrode interface
  - @ Interconnect oxide interface
  - @ Interconnect-IC oxide interface
  - In Contact Material