

# 2.5D/3D IC Packaging

## Process Flow

**FRT**  
Measuring Applications

### FEOL



Wafer Topography, Step Height and Width, Thickness and TTV, Roll-Off Amount, Nanotopography, Roughness, Bow, Warpage, Defect Inspection (Particles and Holes)

### Patterning



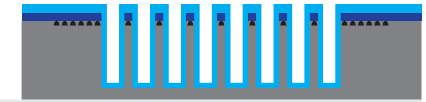
Photoresist Thickness and TTV, Litho CD, Overlay, Defect Inspection (Particles and Holes)

### TSV etching



TSV Etching Depth, Width and Pitch, CD Metrology, Sidewall Angle, Defect Inspection (Photoresist Residuals)

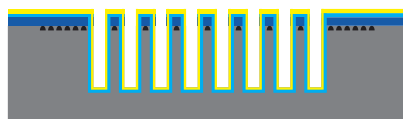
### TSV isolation



Dielectric Thickness, Layer Coverage and Uniformity, Defect Inspection (Layer Cracking and Delamination)

**FRT**  
Measuring Applications

### Seed/barrier



Barrier Thickness, Layer Coverage and Uniformity, CD Metrology, Defect Inspection (Layer Cracking, Delamination and Voids)

### TSV filling



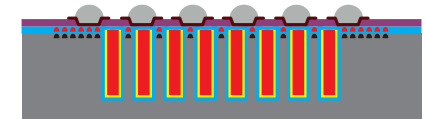
Cu Deposition Thickness, CD Metrology, Defect Inspection (Seams, Voids, Dimples, Recesses and Cu-protrusion) Strain around TSVs

### CMP



Cu Filled TSVs Topography, Flatness, Uniformity and CD Metrology, Defect Inspection (Dishings and Erosions), Wafer Thickness and TTV

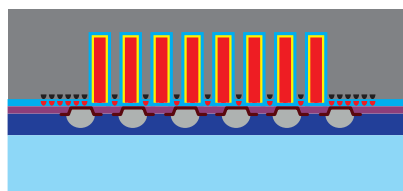
### RDL/UBM/bumping



Line Metallization Thickness, Width and Roughness; Polymer Thickness, Slope Angle and Stress; RDL Final Package Warpage; UBM Height and Roughness; Solder Bump Height, Width, Pitch, Coplanarity and Defect Inspection

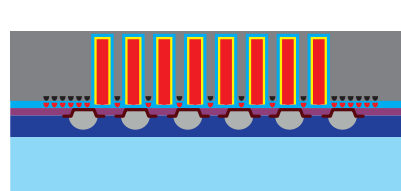
**FRT**  
Measuring Applications

### Temporary carrier bonding



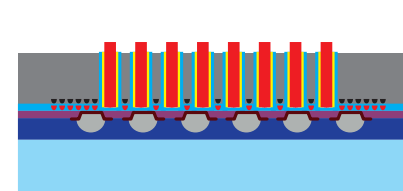
Carrier/Adhesive Thickness, TTV and Uniformity, Bonded Wafer Thickness, Bow, Warpage and Stress, Alignment Control, Wafer Edge Inspection (Edge Trim), Void Detection

### Backside thinning



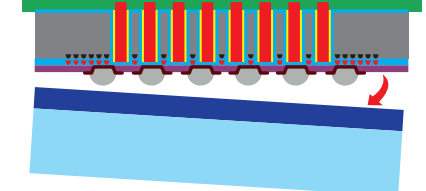
Remaining Si Thickness (RST) and Roughness after Grinding, Wafer Edge Inspection (Edge Trim), Defect Inspection (Cracks)

### Nailing



Remaining Si Thickness (RST) after Etching, Cu Nail Height, Uniformity, Width, Pitch, Coplanarity and Defect Inspection

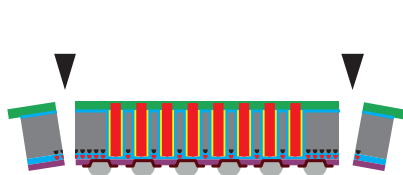
### Carrier debonding



Solder Bump Height, Width, Pitch, Coplanarity and Defect Inspection (Adhesive Residuals, Cracks and Delamination), Isolation Layer Thickness and Uniformity

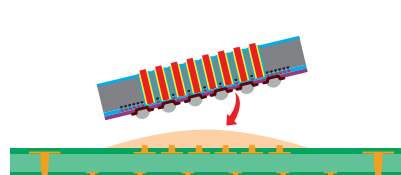
**FRT**  
Measuring Applications

### Dicing



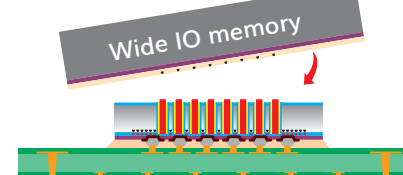
Groove Depth, Width and Uniformity, Protective Film Thickness, Defect Inspection (Edge Chipping and Cracks)

### Logic to BGA



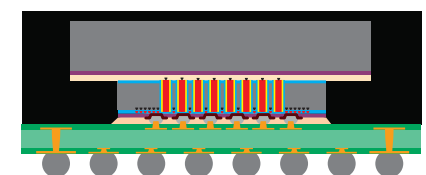
Stacking Overlay, Packaging Topography, Flatness and Planarity, Thermal Load, Warpage, Deformation, Global and Local Strain

### C2C stacking



Stacking Overlay, Final Packaging Topography, Flatness and Planarity, Thermal Load, Warpage, Deformation, Global and Local Strain

### Molding



Mold Topography, Flatness, Roughness and Thickness, Thermal Load, Warpage, Deformation, Global and Local Strain