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2.9.4 Synergies of Operational Stress Factors2.9.5 Synergetic Team; References; 3 Failure Analysis - When?; 3.1 Failure Analysis during the Development Cycle; 3.1.1 Concurrent Engineering; 3.1.2 Failure Analysis during the Design Stage; 3.1.3 Virtual Prototyping; 3.1.4 Reliability Testing during the Development Cycle; 3.2 Failure Analysis during Fabrication Preparation; 3.2.1 Reliability Analysis of Materials; 3.2.2 Degradation Phenomena in Polymers used in Electron Components; 3.3 FA during Fabrication; 3.3.1 Manufacturing History; 3.3.2 Reliability Monitoring; 3.3.3 Wafer-Level Reliability
3.3.4 Yield and Reliability3.3.5 Packaging Reliability; 3.3.6 Improving Batch Reliability: Screening and Burn-In; 3.4 FA after Fabrication; 3.4.1 Standard-Based Testing; 3.4.2 Knowledge-Based Testing; 3.5 FA during Operation; 3.5.1 Failure Types during Operation; 3.5.2 Preventive Maintenance of Electronic Systems; References; 4 Failure Analysis - How?; 4.1 Procedures for Failure Analysis; 4.2 Techniques for Decapsulating the Device and for Sample Preparation; 4.2.1 Decapping Techniques; 4.2.2 Decapsulation Techniques; 4.2.3 Cross-Sectioning; 4.2.4 Focused Ion Beam; 4.2.5 Other Techniques
4.3 Techniques for Failure Analysis4.3.1 Electrical Techniques; 4.3.2 Optical Microscopy; 4.3.3 Scanning Probe Microscopy (SPM); 4.3.4 Microthermographical Techniques; 4.3.5 Electron Microscopy; 4.3.6 X-Ray Techniques; 4.3.7 Spectroscopic Techniques; 4.3.8 Acoustic Techniques; 4.3.9 Laser Techniques; 4.3.10 Holographic Interferometry; 4.3.11 Emission Microscopy; 4.3.12 Atom Probe; 4.3.13 Neutron Radiography; 4.3.14 Electromagnetic Field Measurements; 4.3.15 Other Techniques; References; 5 Failure Analysis - What?; 5.1 Failure Modes and Mechanisms at Various Process Steps; 5.1.1 Wafer Level
5.1.2 Packaging

Sommario/riassunto

Failure analysis is the preferred method to investigate product or process reliability and to ensure optimum performance of electrical components and systems. The physics-of-failure approach is the only internationally accepted solution for continuously improving the reliability of materials, devices and processes. The models have been developed from the physical and chemical phenomena that are responsible for degradation or failure of electronic components and materials and now replace popular distribution models for failure mechanisms such as Weibull or lognormal. Reliability engineers nee