

Special Section on the reliability of advanced microelectronic packaging

Modern technologies including smart phones, computers, industrial automation, automobiles, and internet are made possible by integrated circuits and the associated packages. The package needs to possess a certain level of reliability to carry out its intended task. The IEEE defines reliability as the ability of an item to perform a required function under stated conditions for a stated period of time. The reliability of advanced microelectronic packaging has emerged as the top priority across the hottest growth markets for semiconductors, including automotive, industrial and cloud-based computing. The reliabilities of mission-critical, some of which are life-saving, packages need to be high. The operational life expectancies of some of those devices must be up to 20 years.

Temperature is a significant factor that affects the reliability of a package. The elevation of temperature during the device operation facilitates a series of physical and chemical processes such as electromigration, diffusion, solid-state reaction, corrosion, and thermal stress development, which can lead to the degradation of the package reliability and must therefore be addressed. The current advancement of the packaging technology also places high importance in heat dissipation to lower the temperature of the package, so as not to compromise the reliabilities of the device and package.

The reliability ultimately depends on the design, materials and fabrication of the package. Improvements can be achieved via optimizations in the three aspects. Addressing reliability failures, to which the understanding of the failure mechanism is critical, has become an important method for the optimizations. The optimization generally requires a comprehensive materials science approach that involves thermodynamics and kinetics, solution and solid-state chemistry, metallurgy, electrochemistry/corrosion, and mechanics.

Papers on reliability of advanced microelectronic packing are solicited for this special issue. Topics include, but are not limited to, the following.

- Packaging reliability issues in areas including networking, automotive, portables, wearables, and wireless power electronics
- TSV and microbump reliability issues
- Material-induced packaging reliability issues
- Processing-induced packaging reliability issues
- Wafer-level packaging reliability issues
- Thermal/electrical/mechanical stress-induced packaging reliability issues
- Corrosion-induced packaging reliability issues
- Designing for packaging reliability

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Please note in your cover letter that the submission is for the **Special Section on the reliability of advanced microelectronic packaging. The deadline is January 31, 2020**