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Characterization of the Effect of thermal Cycling on the Signal Integrity of Interconnect Structures used in 3D Integrated Circuits[1] BINAYAK KANDEL, SPS Adelphi University — The performance and reliability of the microelectronic devices are significantly influenced by the condition of interconnects in Integrated Circuits (IC). These interconnects serve primarily as signal transmission pathways in IC. Good interconnects enable free flow of electrical signals with low impedance. However, microelectronic devices are continuously subjected to fluctuating temperature conditions during their lifetime, which affect the signal integrity of interconnects. Therefore, this project takes a look at the effect of repeated temperature cycling on the reliability and performance of interconnects. Two types of interconnects: Back-End-of-Line (BEOL) and Through-Si-Via (TSV) were studied. We simulate the real world conditions by applying repeated temperature cycling, and use an RF network analyzer to extract the reflection and transmission signal characteristics of the interconnects. The mean-time-to-failure is determined upon their breakdown which is followed by the failure analysis to determine the root cause of failure.

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