**Interfacial Reactions Arising from Low Solder Volume in 3D IC Packaging**

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A typical solder joint in 3D IC has a volume that is 1/1000 that of a flip-chip solder joint. Many new issues arise due to this size effect. These new issues post new threats to the reliability of electronic devices. One well-perceived effect of small solder volume is that the entire solder layer can be completely transformed into intermetallic compounds (IMCs) during device operation or even during the fabrication process. As IMCs tend to be hard and brittle, a solder joint completely made up of IMCs might have inferior mechanical properties. The objectives of this study are (a) to understand the IMCs growth at the regime of very limited solder volume, (b) to observe the IMC morphology during the merging of IMCs, and (c) to reveal the effects of minor inert constituents (such as Ag) on the final morphology of IMCs.

