Challenges Facing Electrochemical Deposition in Wafer Level Packaging

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Abstract

Unlike Damascene where solutions are presented for one node at a time, wafer level packaging (WLP) deals with numerous aspect ratios, wafer pitches, and pattern densities at any given moment. Often, the end user wants to use an all purposed chemistry. From this platform, all of the followings would be electroplated: RDL, microbumps, conventional pillars, and macrobumps for fan out technologies. In this manuscript, there will be discussions of the technical challenges for each of these processes. We will look at the role of accelerator and suppressor on nucleation density, and how that varies across bump dimensions. Most importantly we will show the relevance of levelers on bump uniformity and its direct correlation to the Wagner number. Furthermore, we will present electrochemical methods to understanding the factors that affect deposition rate, within die uniformity (WID), bump shape (dished-flat-domed), and Kirkendal voids at the microscopic level. Finally, we will show practical solutions to address each and every market segment.