

Advanced Packaging and Manufacturing Technology Based on Adhesion Engineering

Wafer-Level Transfer Packaging and Fabrication Techniques Using Interface Energy Control Method

This book introduces microelectromechanical systems (MEMS) packaging utilizing polymers or thin films – a new and unique packaging technology. It first investigates the relationship between applied load and opening displacement as a function of benzocyclobutene (BCB) cap size to find the debonding behavior, and then presents BCB cap deformation and stress development at different opening displacements as a function of BCB thickness, which is a criterion for BCB cap transfer failure.

Transfer packaging techniques are attracting increasing interest because they deliver packaging caps, from carrier wafers to device wafers, and minimize the fabrication issues frequently encountered in thin-film or polymer cap encapsulation. The book describes very-low-loss polymer cap or thin-film-transfer techniques based on anti-adhesion coating methods for radio frequency (RF) (-MEMS) device packaging. Since the polymer caps are susceptible to deformation due to their relatively low mechanical stiffness during debonding of the carrier wafer, the book develops an appropriate finite element model (FEM) to simulate the debonding process occurring in the interface between Si carrier wafer and BCB cap. Lastly, it includes the load–displacement curve of different materials and presents a flexible polymer filter and a tunable filter as examples of the applications of the proposed technology.

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