

3D Stacking via Transfer Printing and Wafer Bonding: Interface and Process Mechanics

Transfer printing and wafer bonding processes are enabling technologies for the fabrication of 3D devices, including advanced nanoelectronics, optoelectronics, and MEMS. Realizing the full potential of these 3D stacking technologies requires an understanding and control of the mechanics of the processes. Process mechanics governs success or failure in bonding and transfer, impacts achievable layer-to-layer alignment, and controls residual stresses in the fabricated structure. This talk will describe routes for advanced device fabrication via aligned stacking and will describe our efforts to understand and exploit the mechanics of transfer printing and wafer bonding processes. Specifically, the talk will cover the direct adhesion of silicon components at room-temperature, mechanics-based process models that can be used to guide the development of transfer printing and bonding processes, and a discussion of the role of mechanical deformation in later-to-layer alignment.

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