Advancements in Bonding Technologies Enabling Innovations in Device Structures and Packaging Capabilities

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Abstract:

As new applications, such as AI and autonomous driving technologies, demand more performances from IC chips and integrated systems, semiconductor industry is meeting these challenges in two distinctly different ways, namely, "More Moore" and "More Than Moore". The "More than Moore" approach seems to provide a broad ranges of pathways to enable a level of device or system performance that was not achievable before.

In advanced logic, the collaborative control between fusion bonding equipment and scanner systems enable the breakthrough of backside power delivery, by ensuring nano-TSVs with lithographic overlay within nanometers for required accuracy and contact density of 10M/mm2 range.

In NAND flash devices, hybrid bonding has emerged as a creative, and now mandatory solution for 400+ layer stacks; Meanwhile engineers are leveraging fusion and hybrid bonding to revolutionize the DRAM architectures – transitioning from traditional 6F2 layouts to 4F2 designs, and ultimately 3D structures.

In the area of advanced packaging, hybrid bonding achieves an order of magnitude improvement in I/O density over Micro Bumping. This breakthrough enables 10X higher interconnect density for a synergistic gain in bandwidth and energy efficiency, reducing thermal resistance by >30%, and optimal packaging solutions for HBM and AI chips.

Company Introduction:

As a leading thin-film equipment maker, Piotech is also the domestic leader in providing WtW and DtW bonding technology related equipment, including hybrid and fusion bonding, metrology/inspection and debonding systems. Our innovative technologies demonstrated in our bonding products rival the best in the industry.