

Lithography for Advanced Supercomputing Devices

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GOAL

To develop a process for identifying and correcting device misalignment in multi-wafer assemblies for next-generation supercomputers.

KEY ACCOMPLISHMENTS

Located device registration errors using the laser lithography system's pattern recognition capability.

Developed a process for post-metrology, direct-write lithography to correct for the registration errors in bonded wafer stacks, enabling assembly of a functioning supercomputer system module which attaches a stack of vertical memory chips directly to the CPU.

Transitioning the process in-house; IBM purchasing customized tools based on experience gained in the NanoFab.

KEY NANOFAB PROCESS

Direct laser writing after pattern recognition.

Left: Photograph of a current generation Blue Gene supercomputer. Middle: Photograph and schematic of the new CPU/memory device. Right: Scanning electron micrograph of adjacent memory chips connected by 5 μm-wide copper conductors defined by laser lithography.



REFERENCE

ExaScale computing study: technology challenges in achieving exascale systems (DARPA/IPTO, 2008).