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(71) Applicant: **KLA CORPORATION** [US/US]; Legal Department, One Technology Drive, Milpitas, California 95035 (US).

(72) Inventors: **ZACH, Franz**; 16565 Soda Springs Rd, Los Gatos, California 95033 (US). **SMITH, Mark D**; 1596 Koch Lane, San Jose, California 91225 (US). **GRONHEID, Roel**; Sint-Jansbergsesteenweg 83, B-3001 Leuven (DE).

(74) Agent: **MCANDREWS, Kevin** et al.; Legal Department, One Technology Drive, Milpitas, California 95035 (US).

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(54) Title: SYSTEM AND METHOD FOR OPTIMIZING THROUGH SILICON VIA OVERLAY

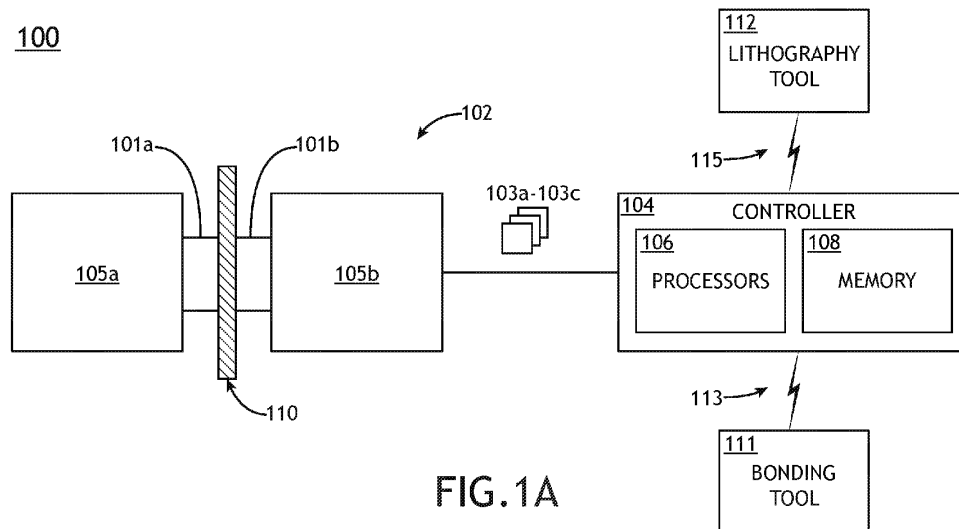


FIG. 1A

(57) Abstract: A wafer shape metrology system includes a wafer shape metrology sub-system configured to perform stress-free shape measurements on an active wafer, a carrier wafer, and a bonded device wafer. The active wafer includes functioning logic circuitry and the carrier wafer is electrically passive. The wafer shape metrology system includes a controller communicatively coupled to the wafer shape metrology sub-system. The controller is configured to receive stress-free shape measurements; determine overlay distortion between features on the active wafer and the carrier wafer; and convert the overlay distortion to a feed-forward correction for one or more lithographic scanners. The controller is also configured to determine a control range for a bonder or lithography scanner; predict an overlay distortion pattern; calculate an optimal control signature based on a minimal achievable overlay; and provide a feed-forward correction to the bonder or lithography scanner based on the calculated optimal control signature.

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