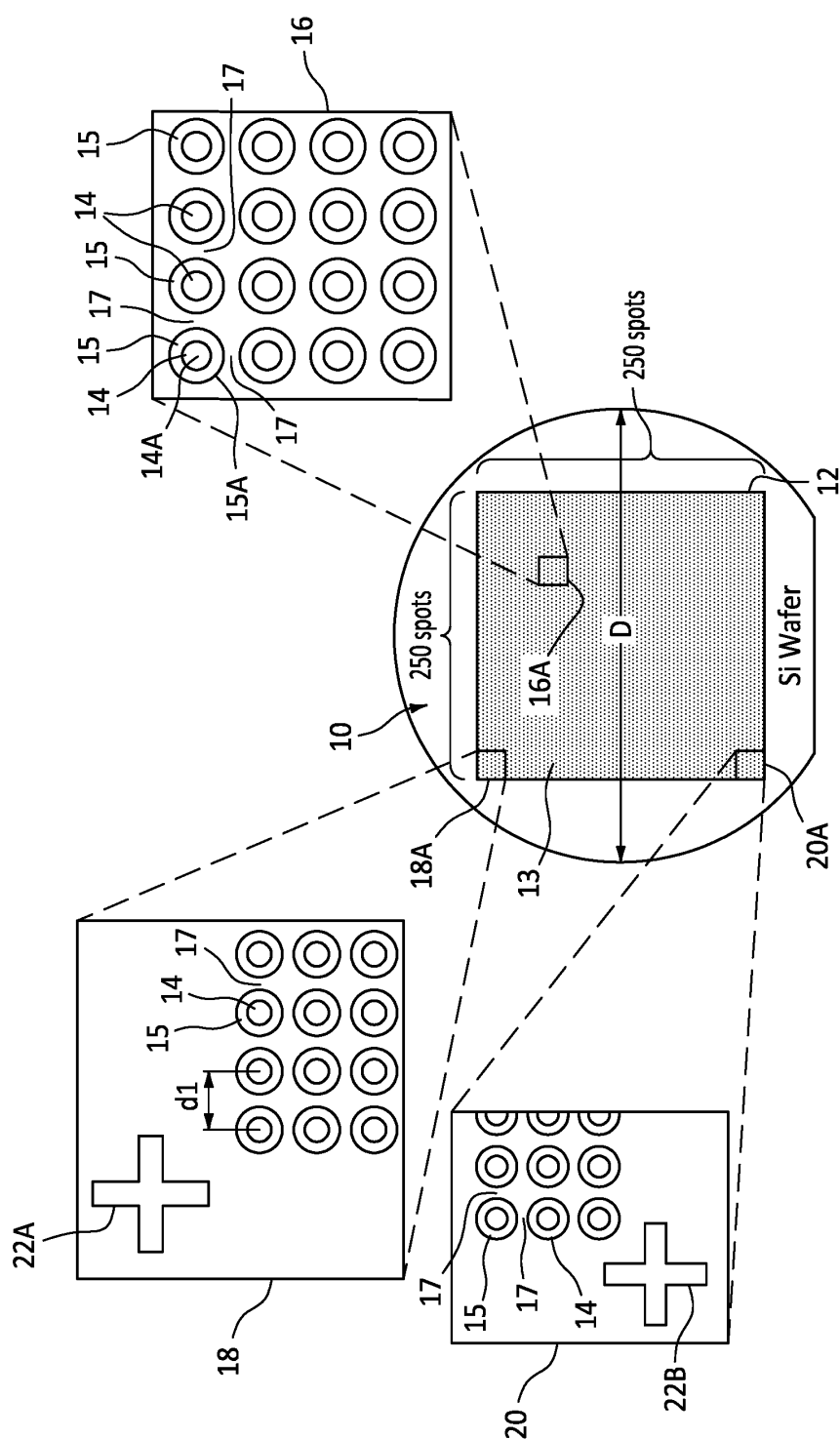
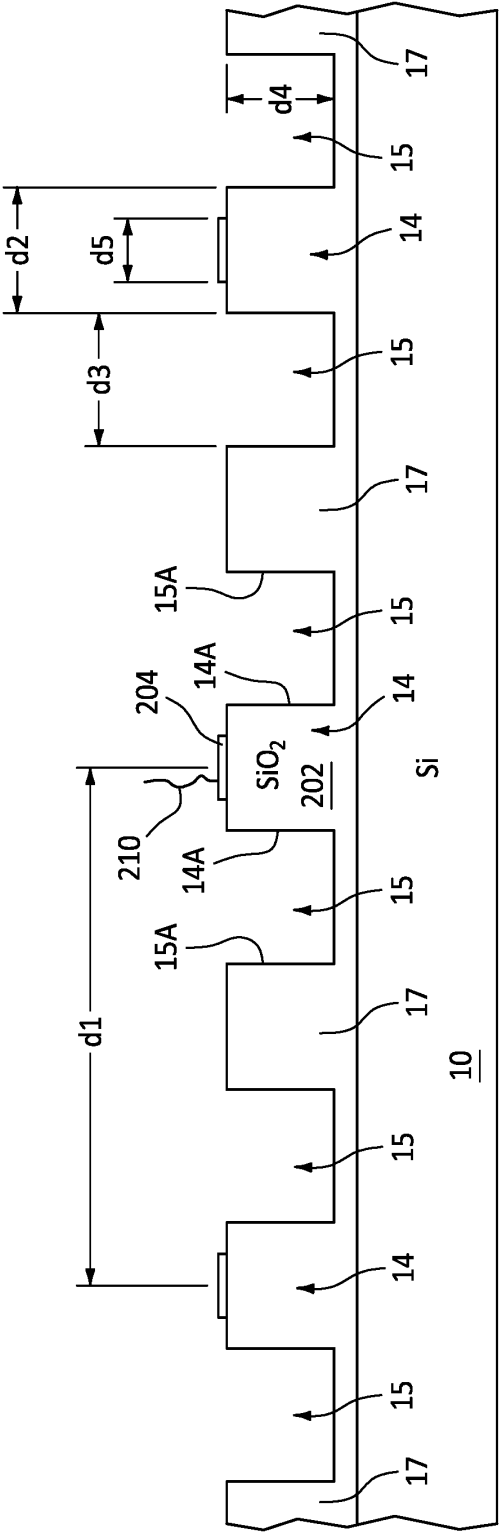




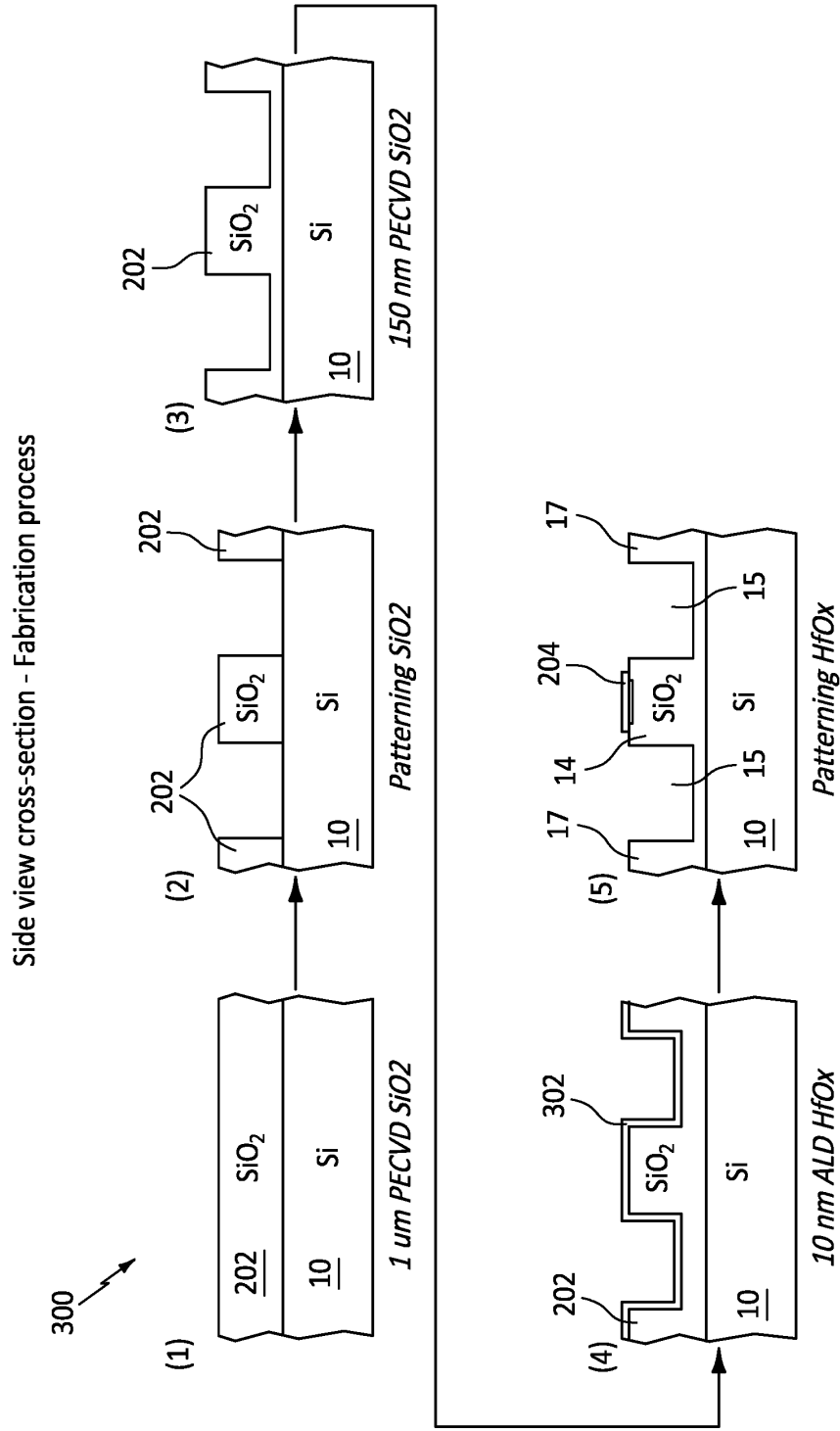
Silicon Wafer with Spot Pattern

FIG. 1



Side view - Patterned wafer array

FIG. 2



Design of the patterned wafers

FIG. 3

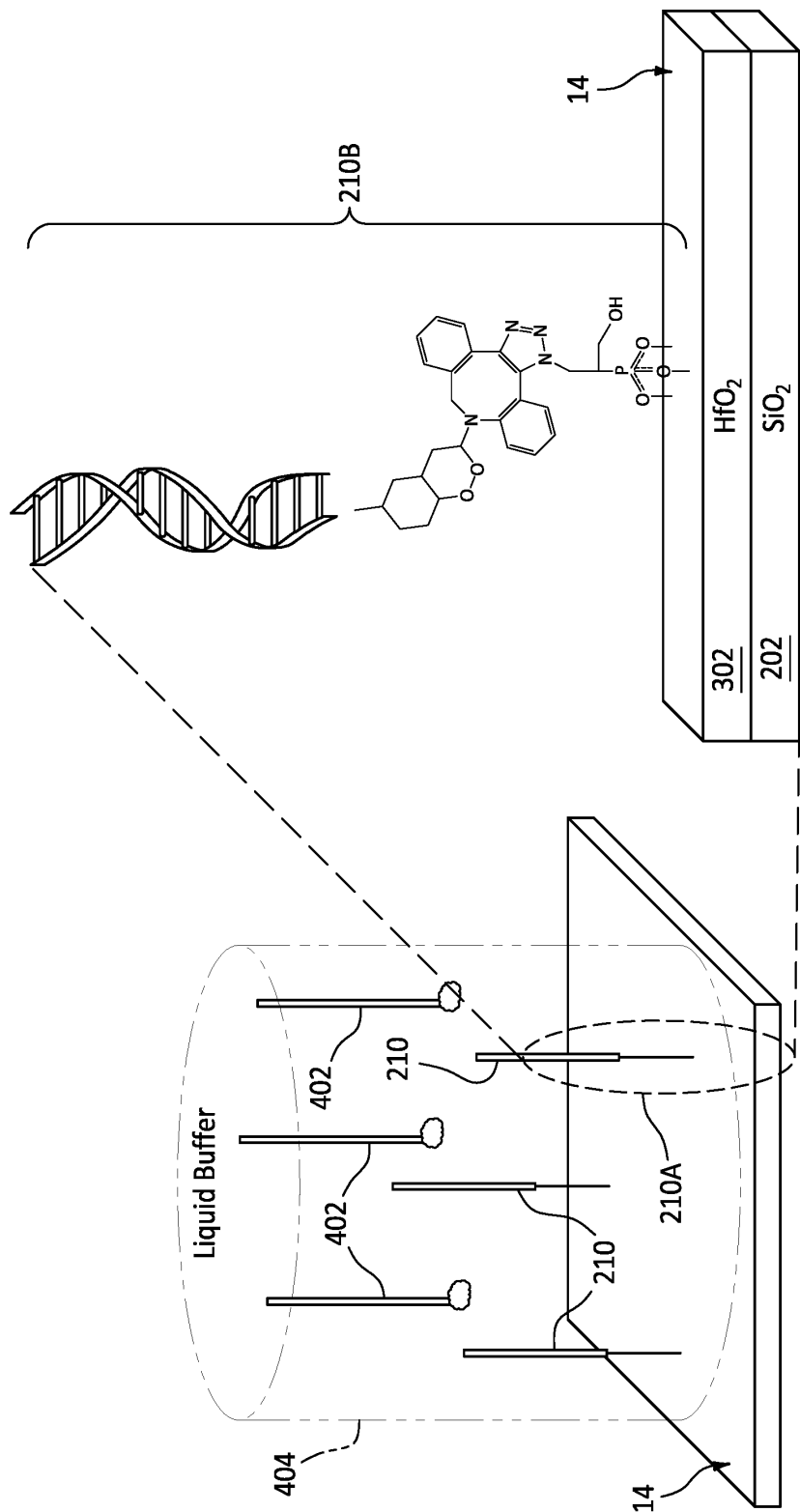


FIG. 4

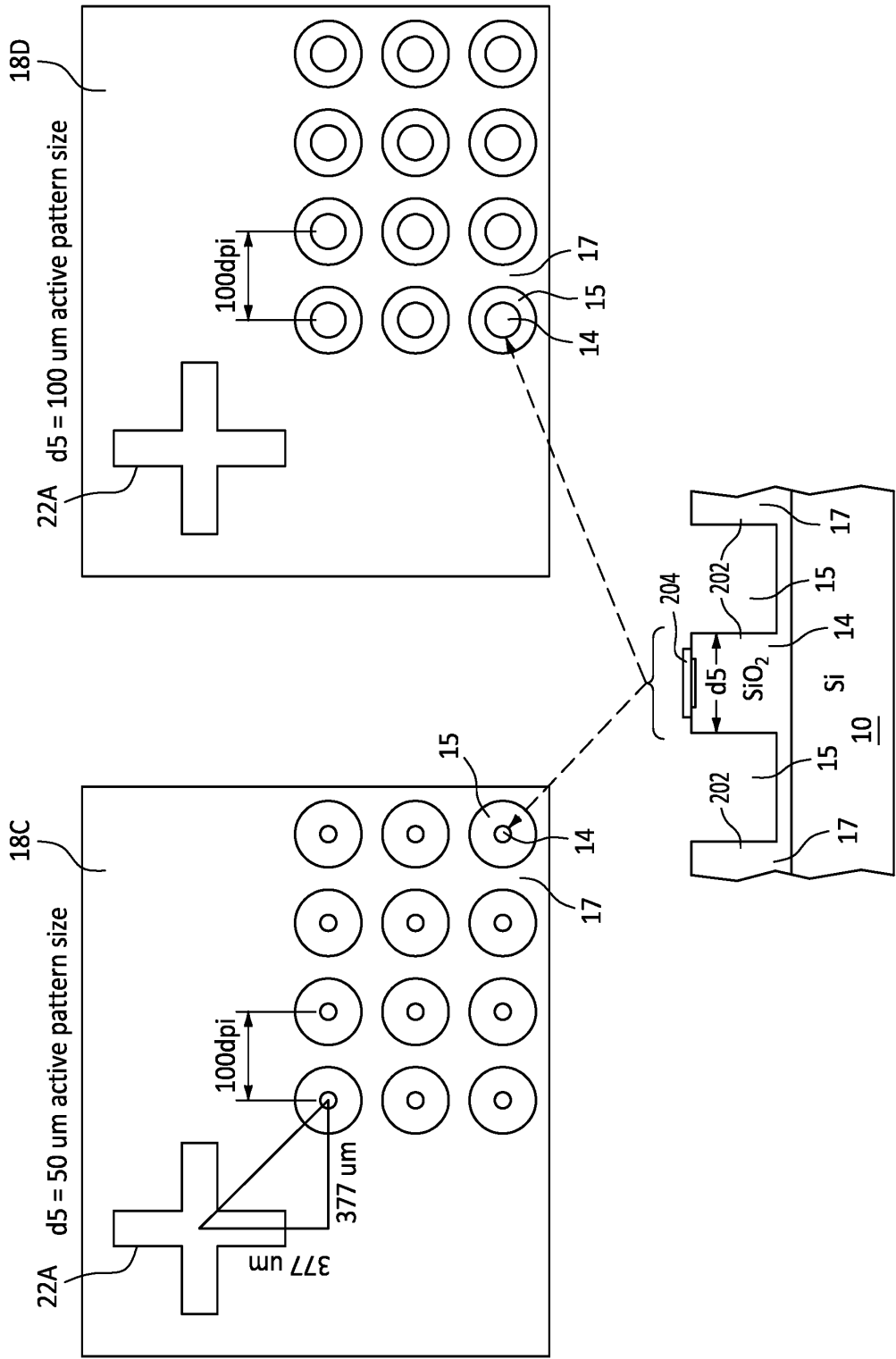


FIG. 5

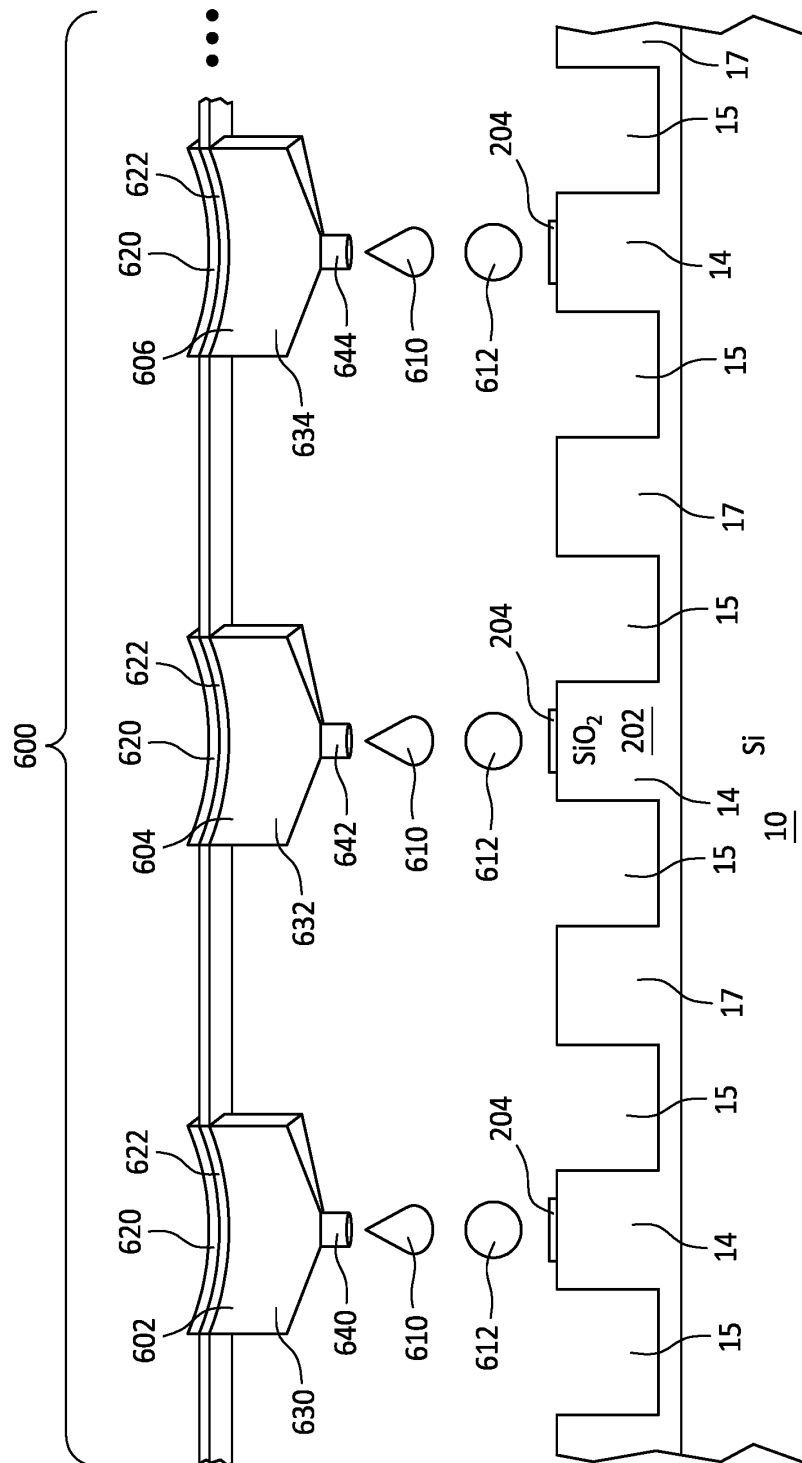


FIG. 6

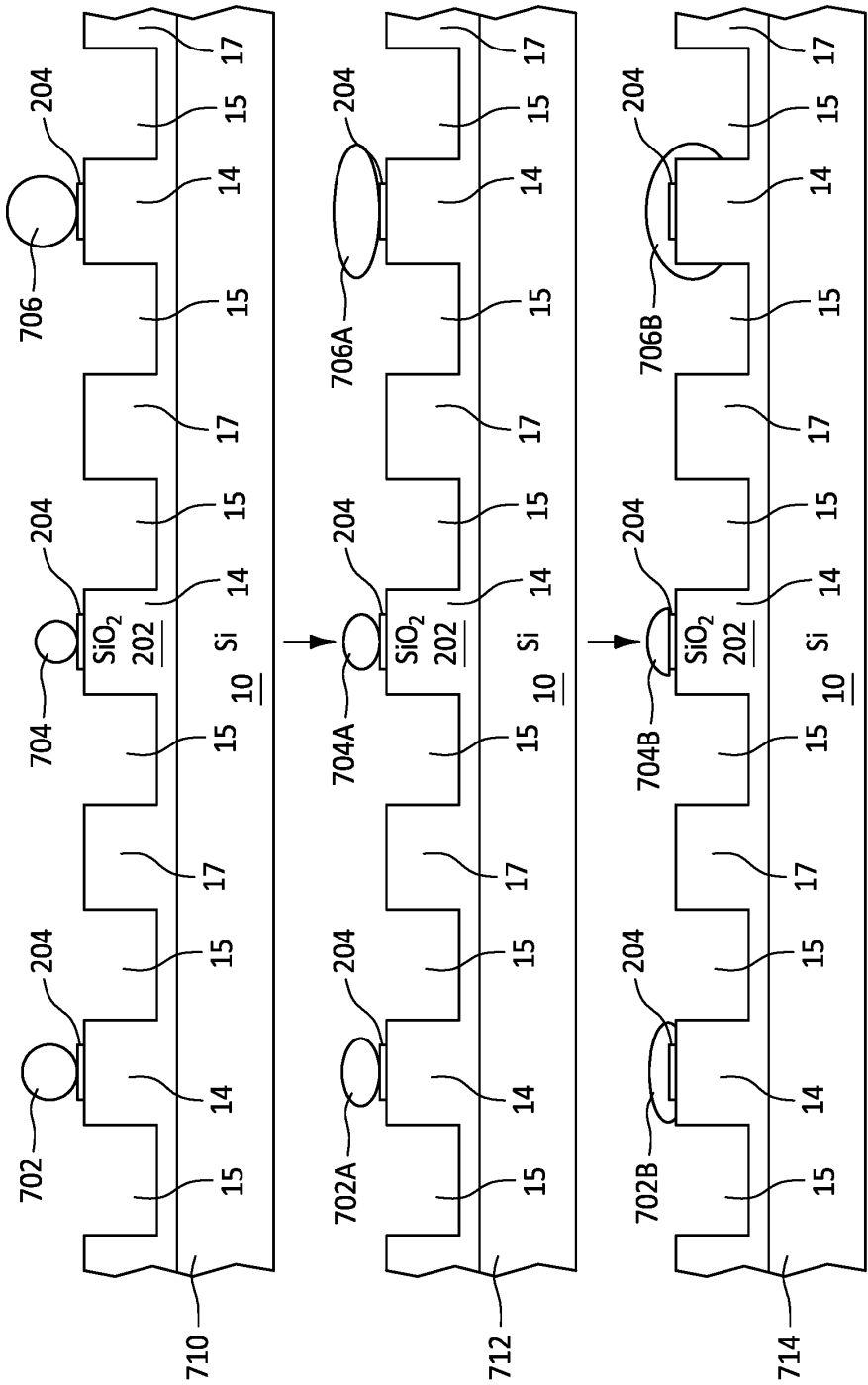


FIG. 7

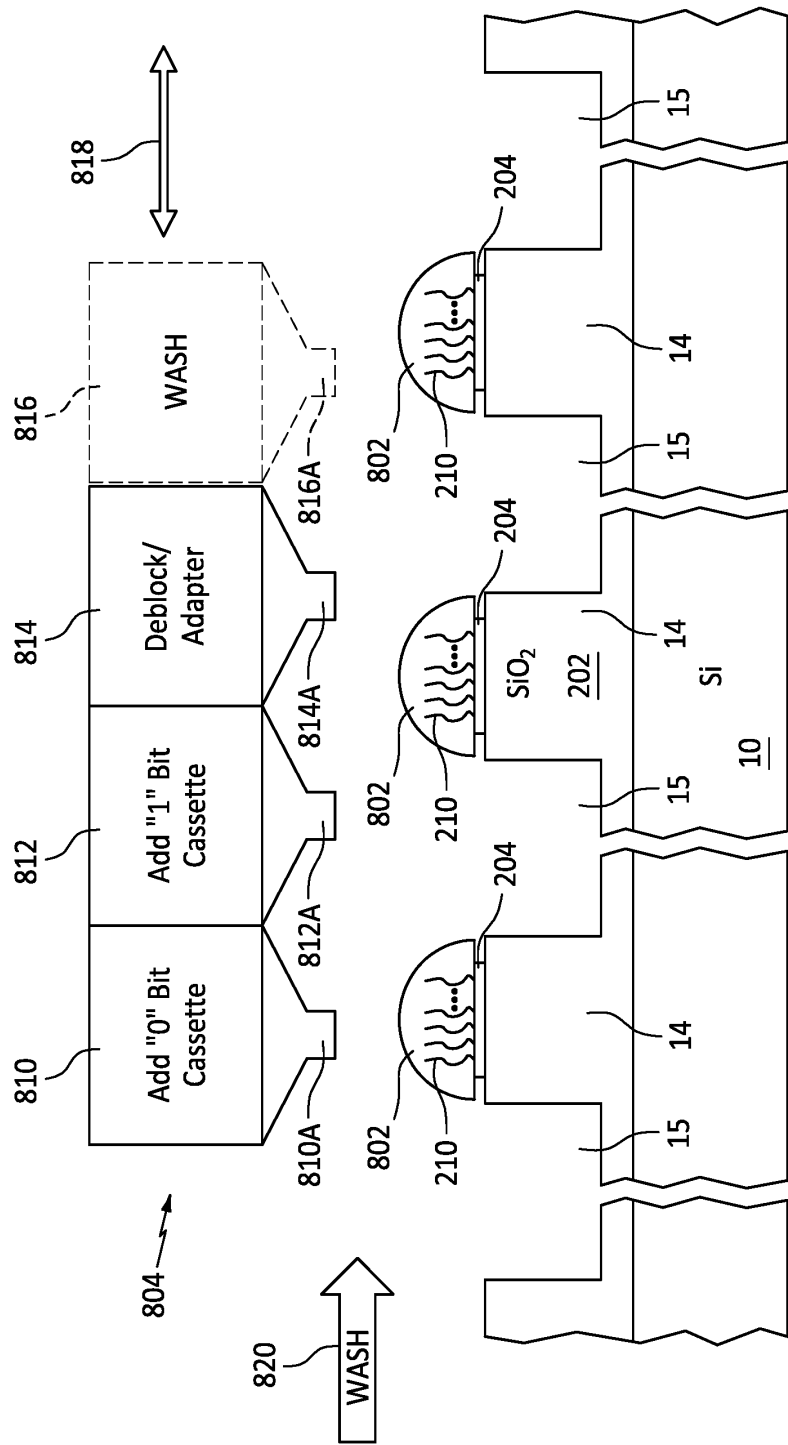


FIG. 8A

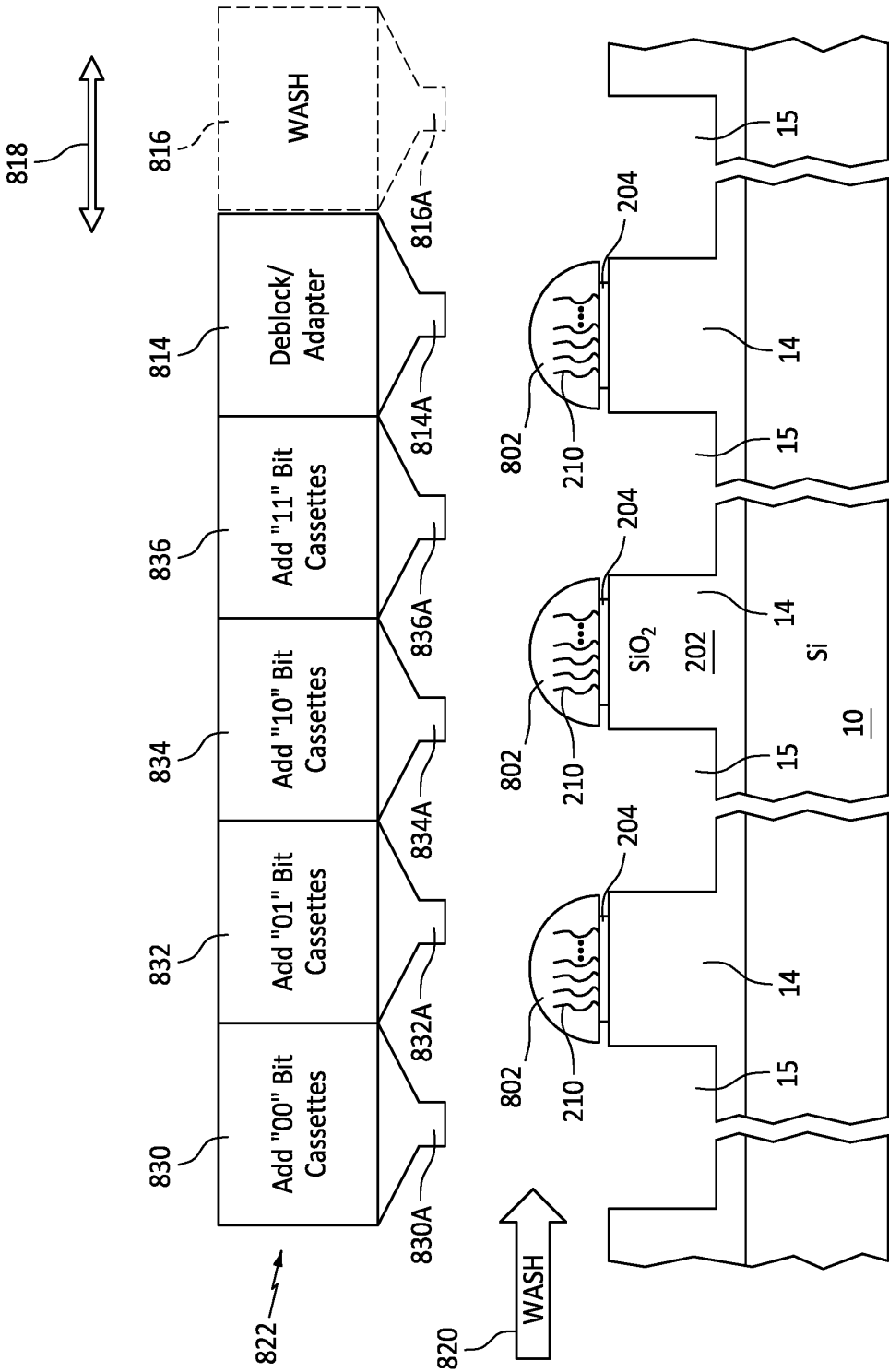


FIG. 8B

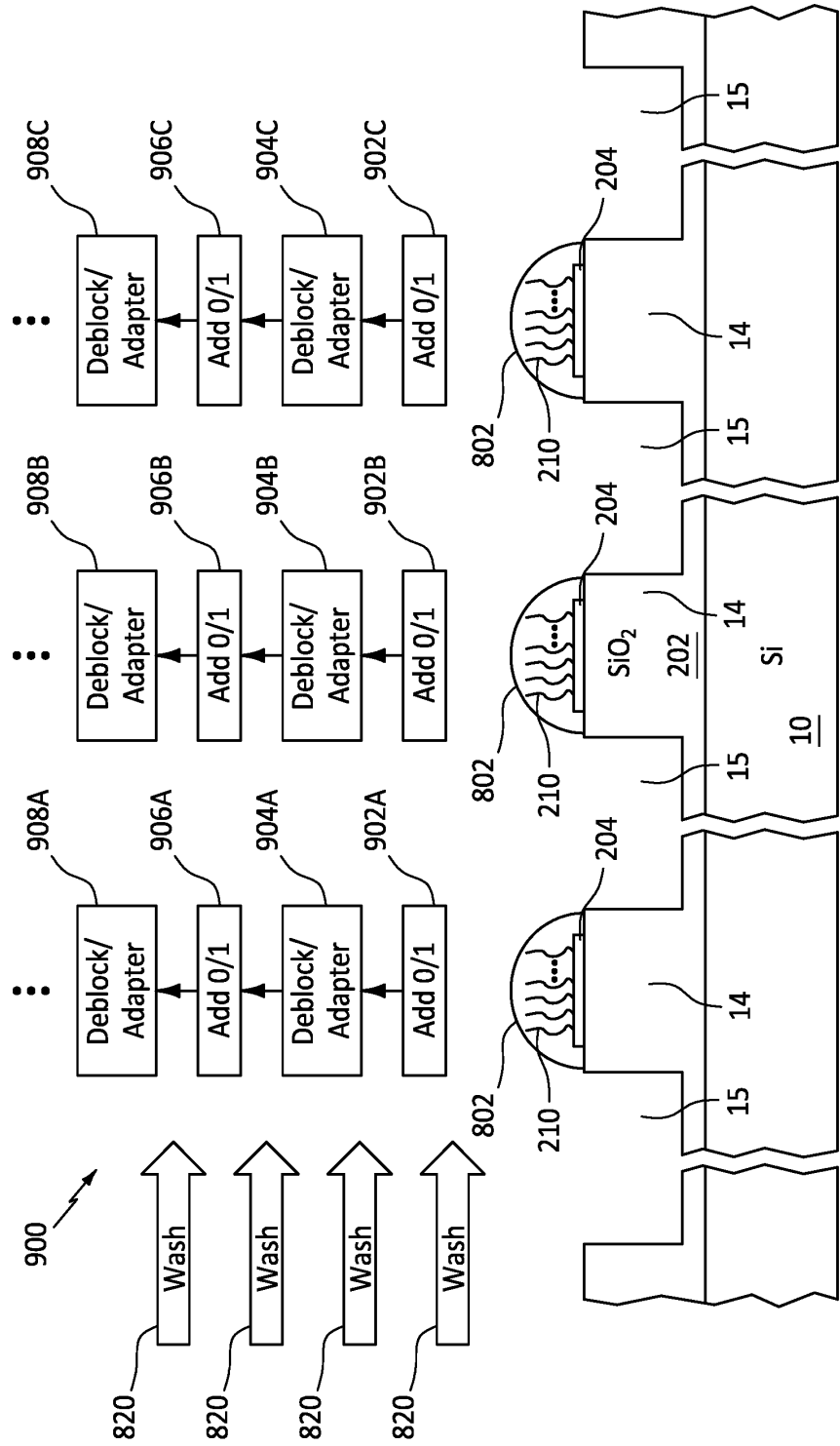


FIG. 9A

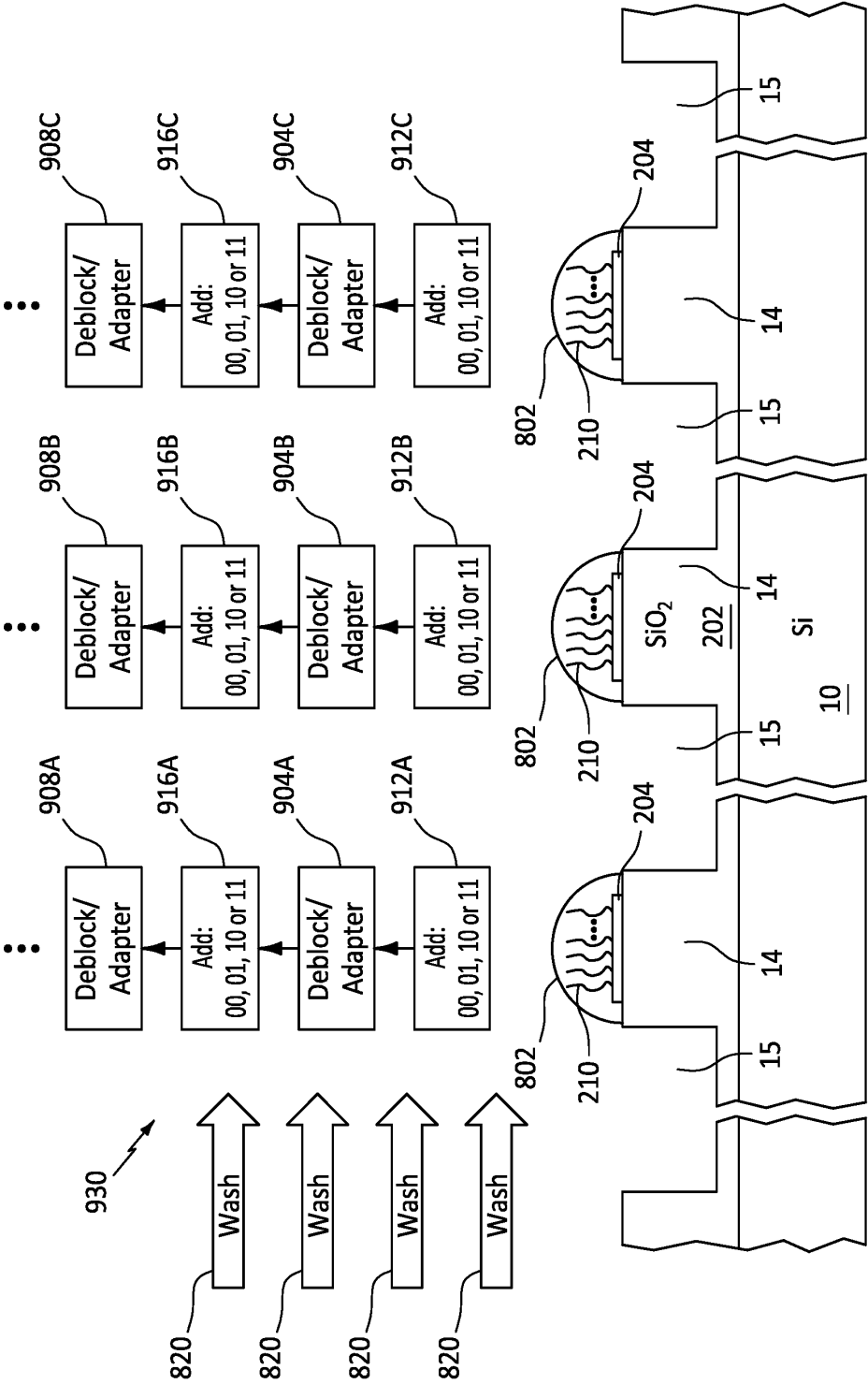


FIG. 9B

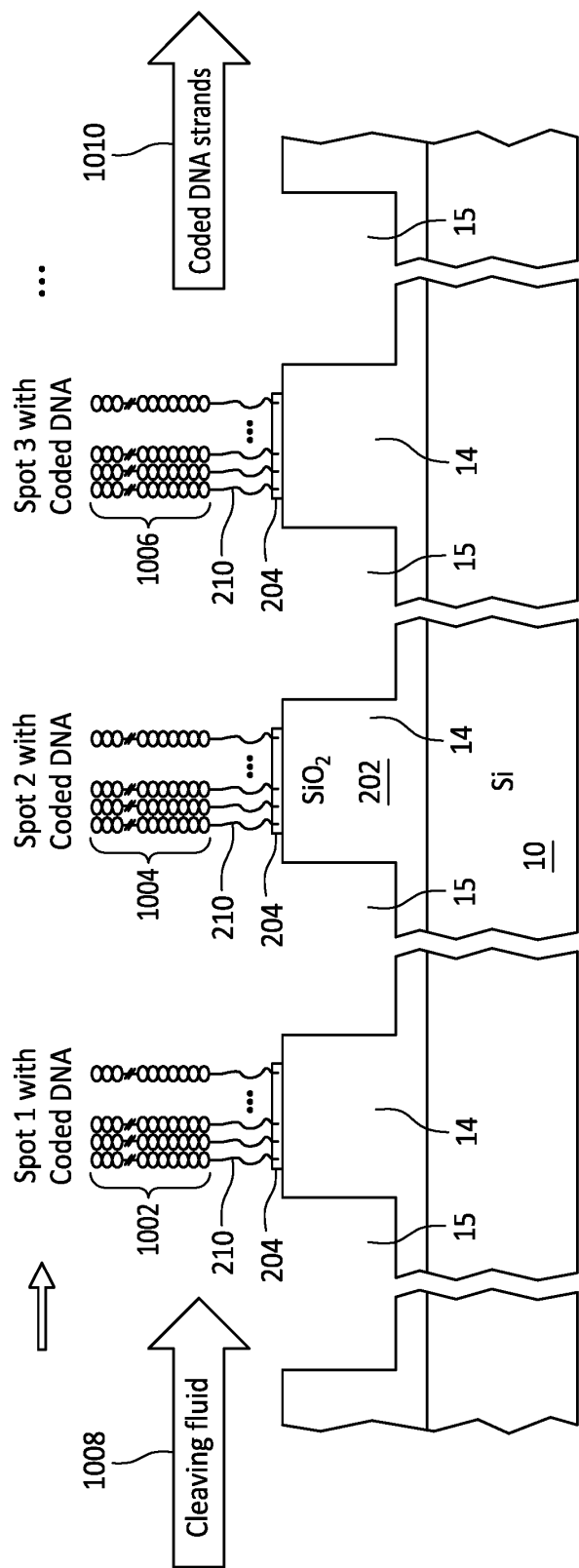


FIG. 10

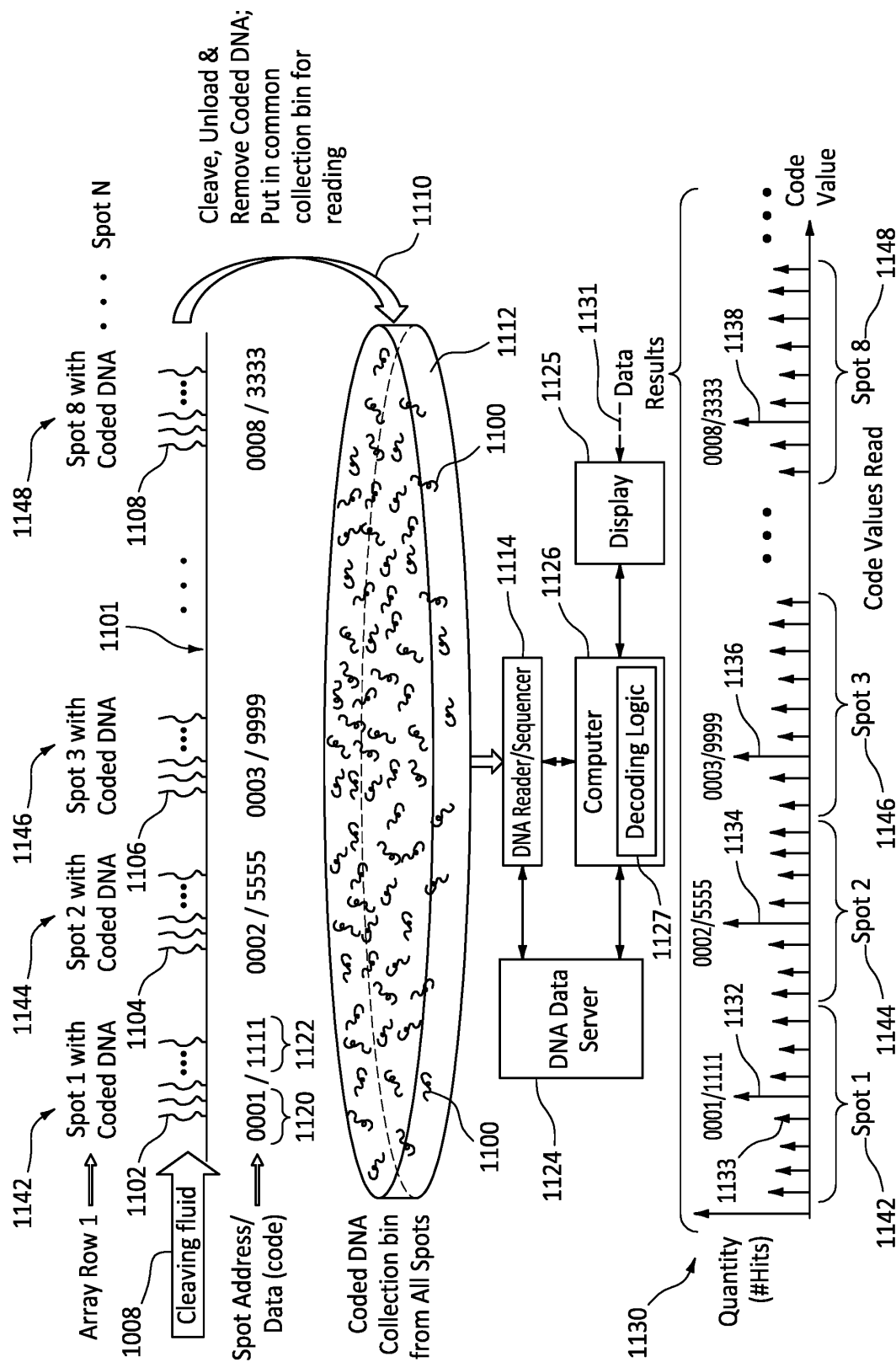


FIG. 11A

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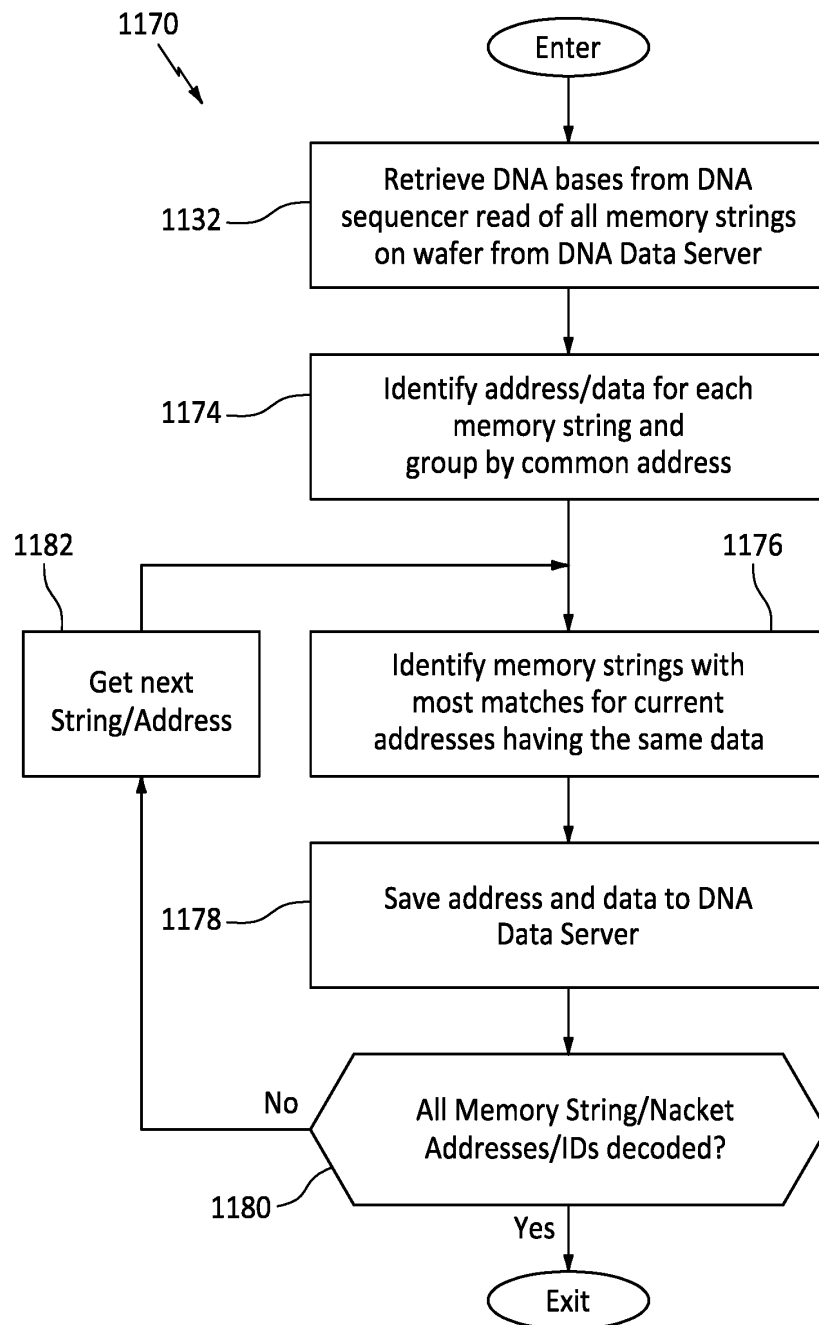


FIG. 11B

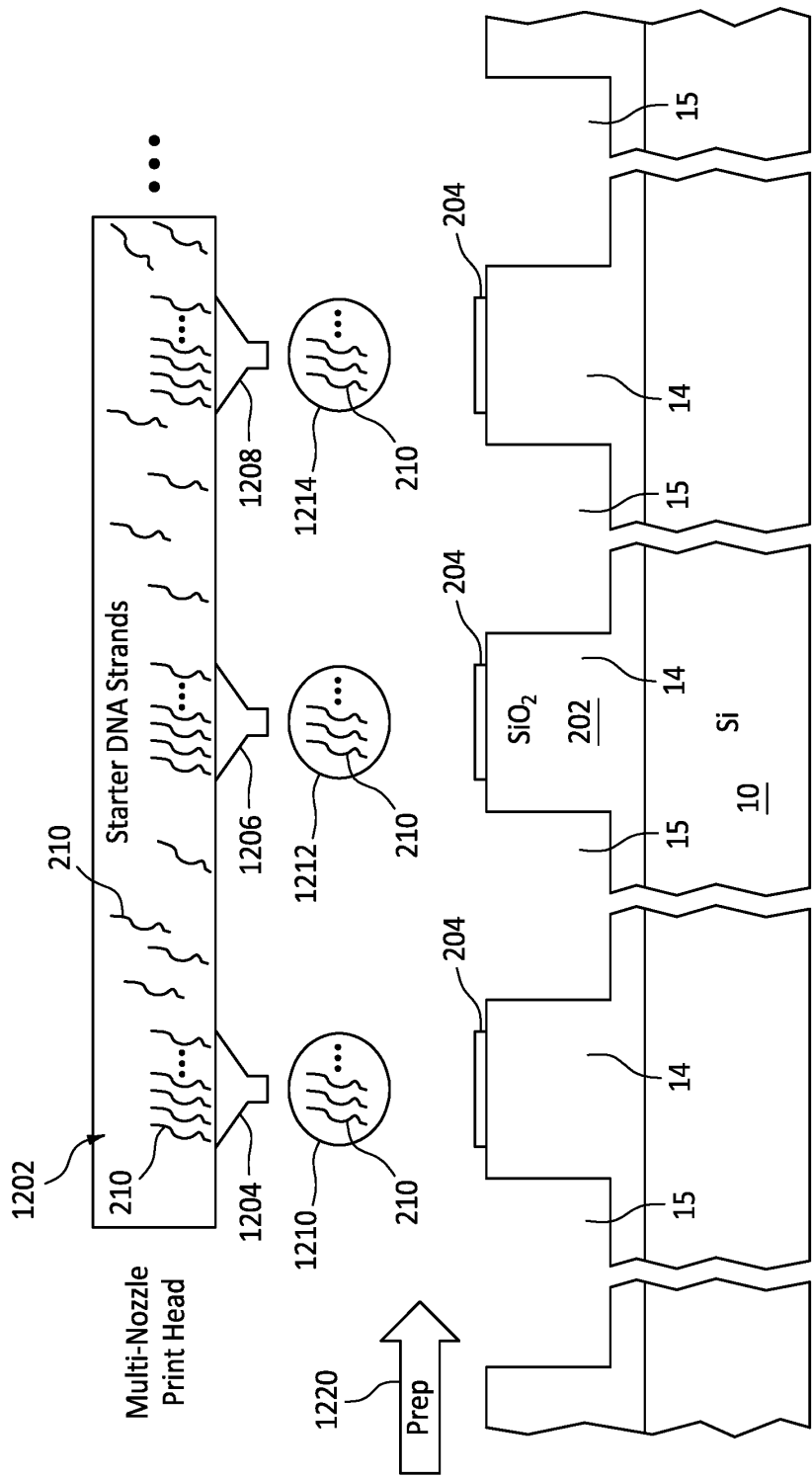


FIG. 12

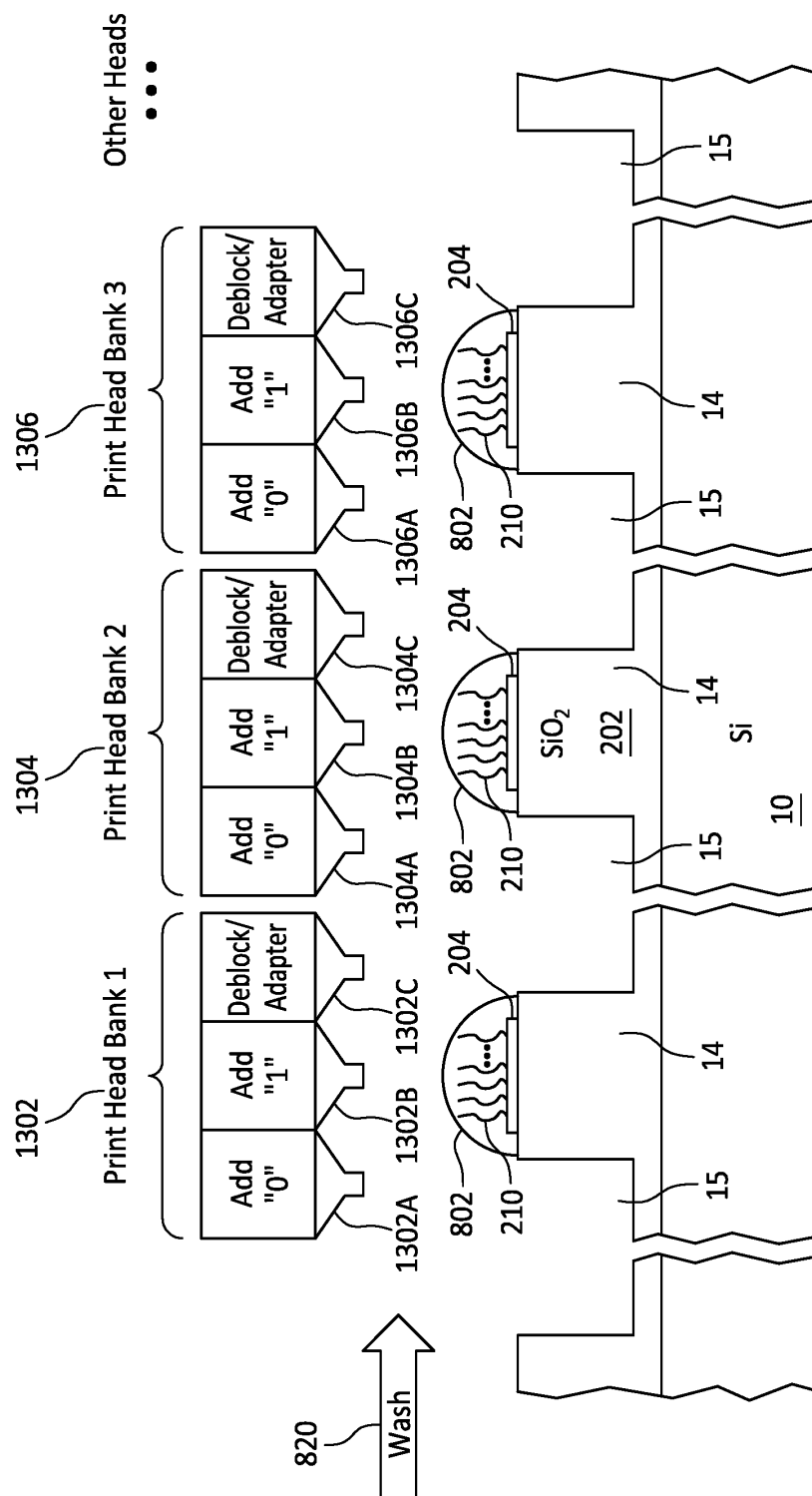


FIG. 13A

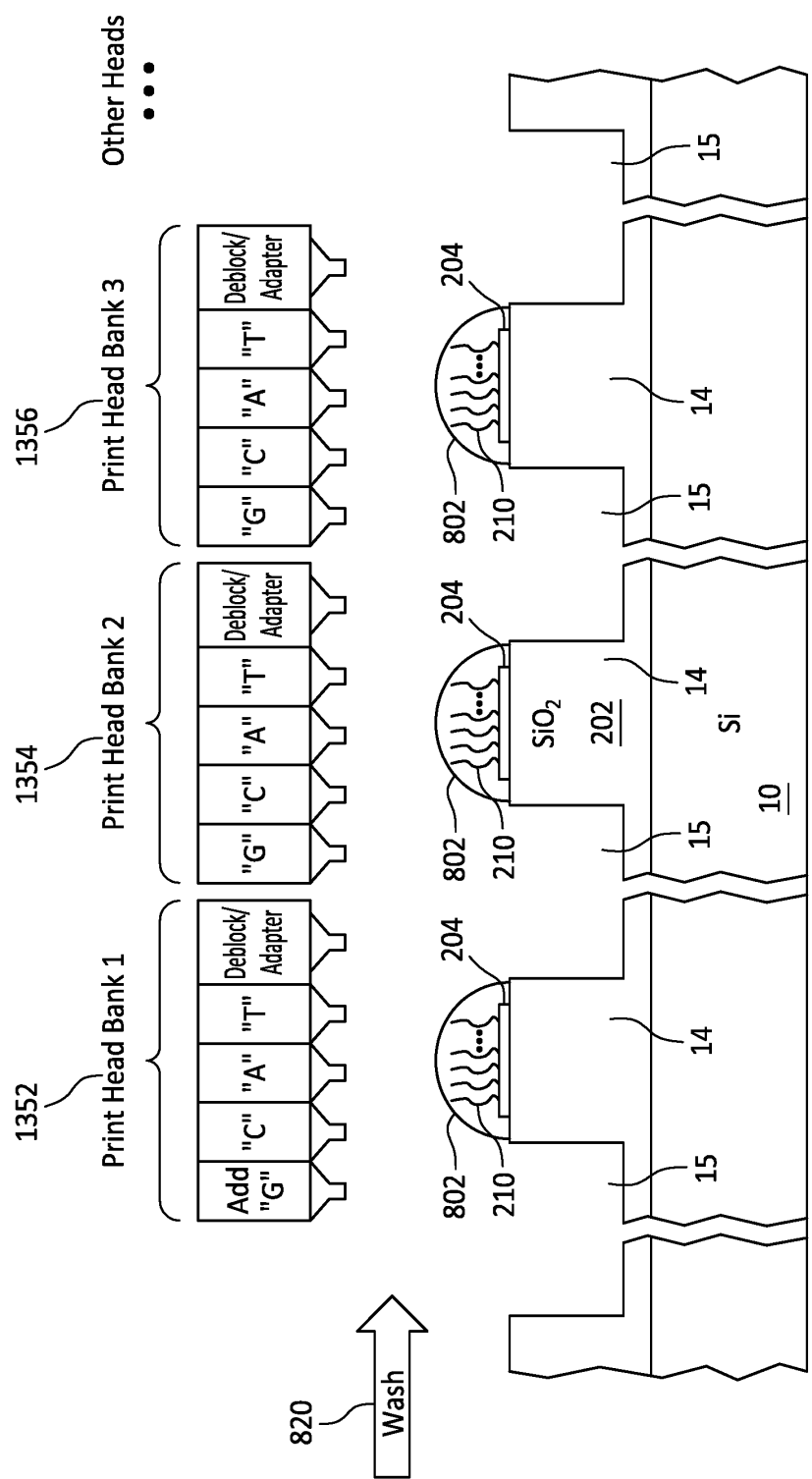


FIG. 13B

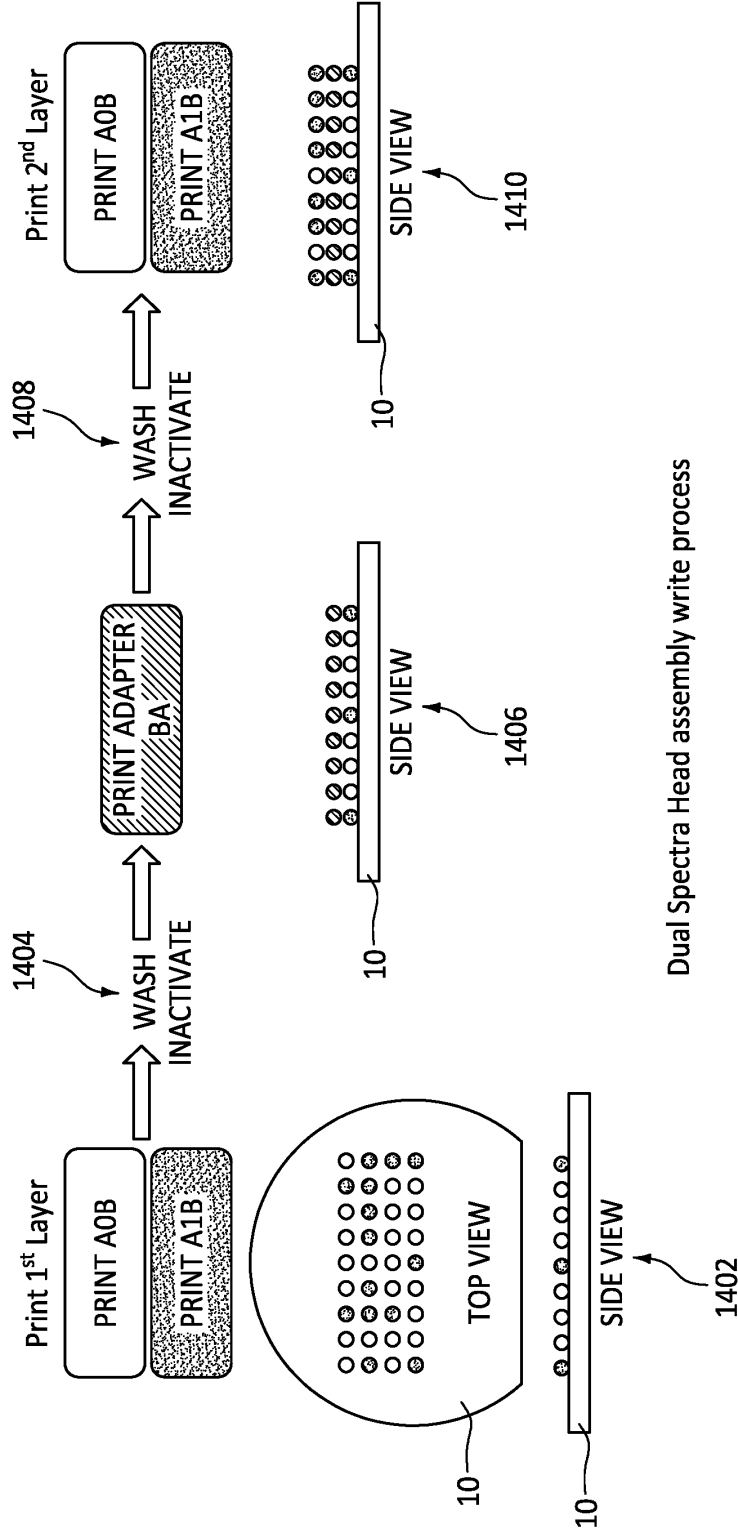


FIG. 14

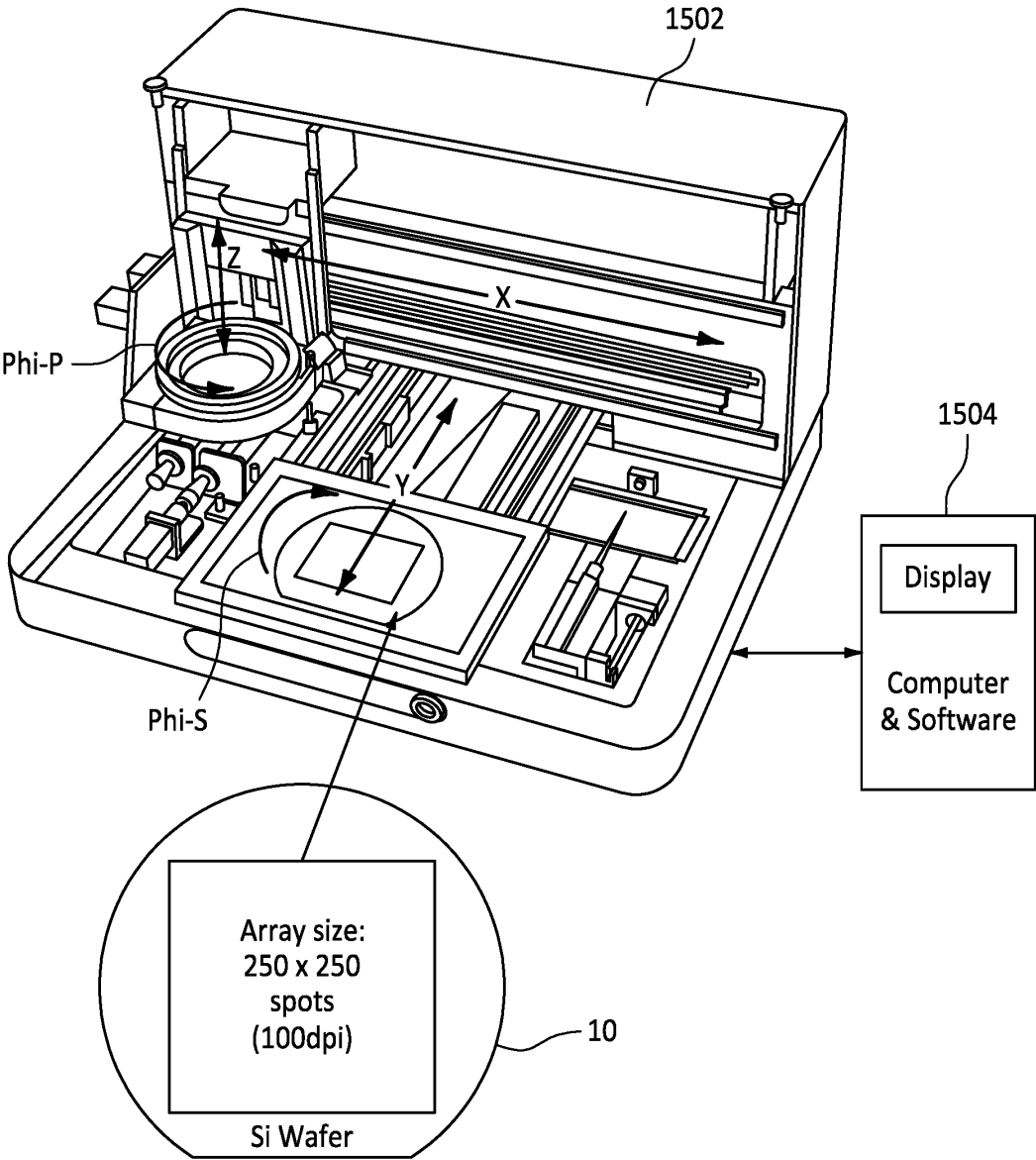
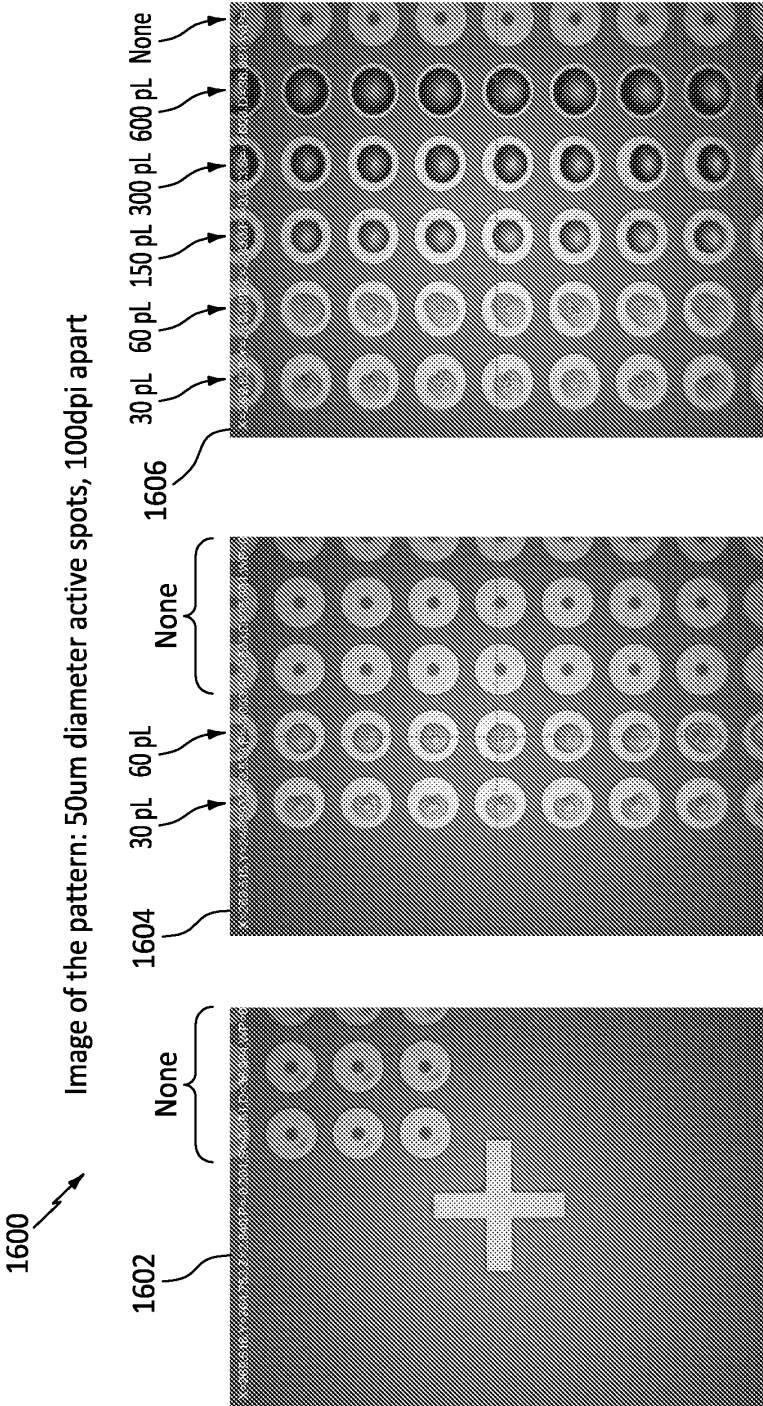
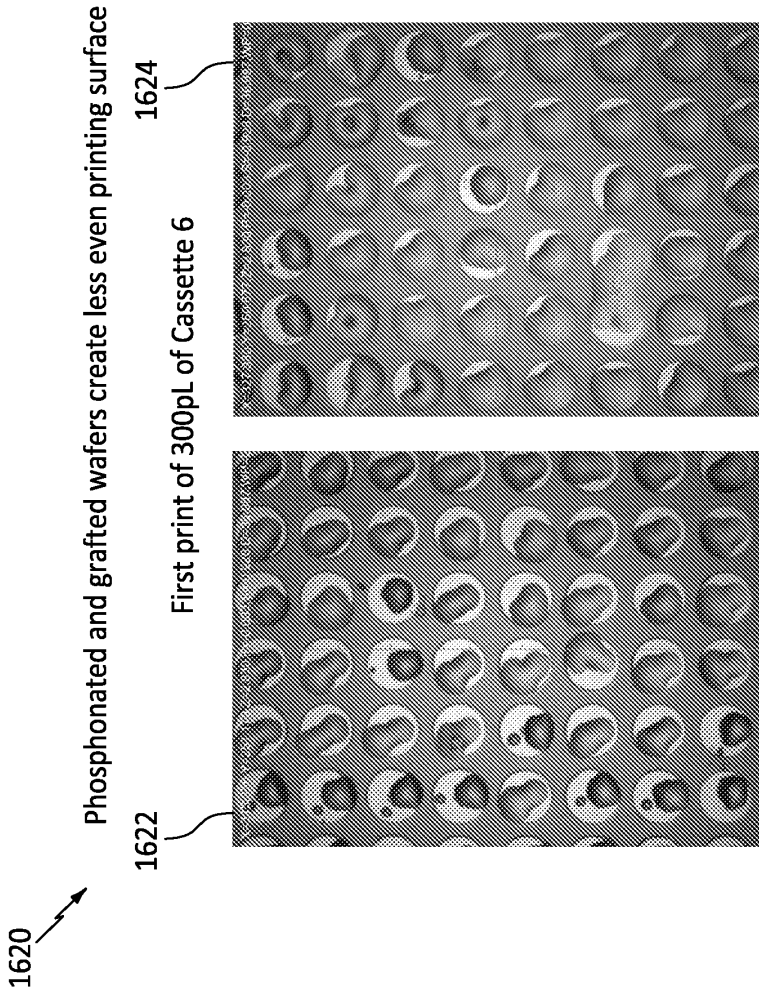


FIG. 15



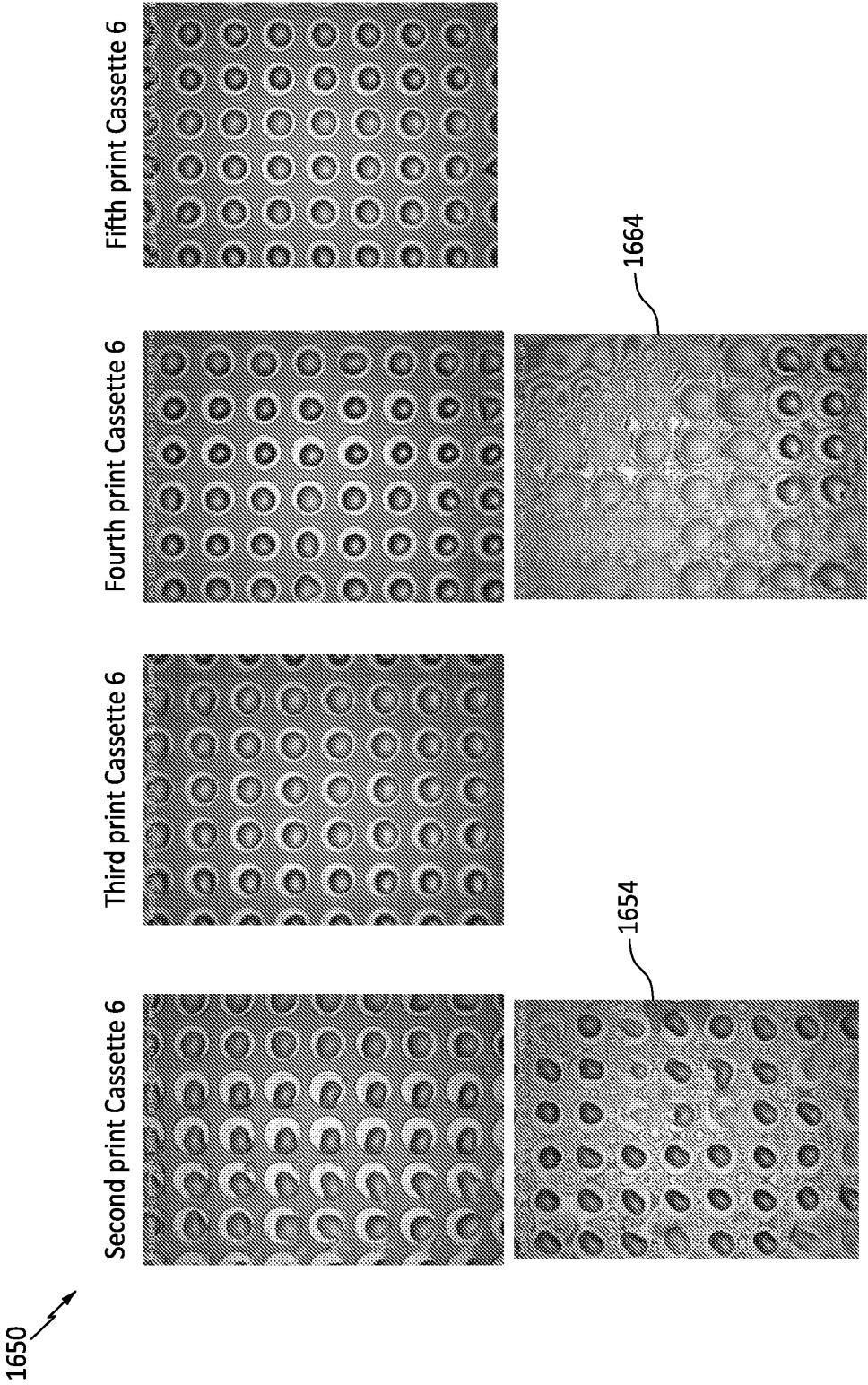
Printing drops of various sizes over the pattern to test how well they cover the active region

FIG. 16A



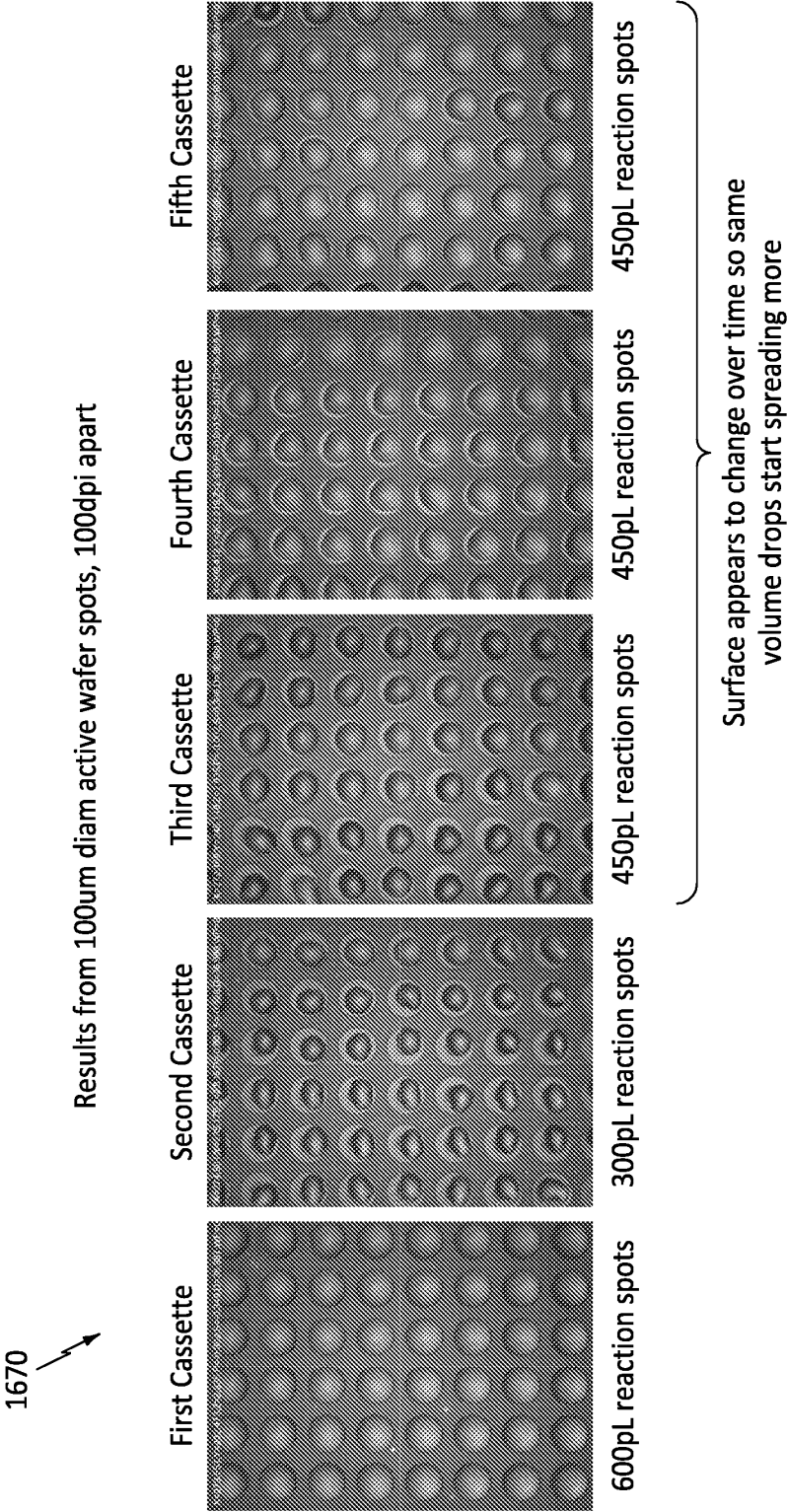
Drops still lands predominantly on the pattern but the shapes are not as nice as on the clean wafer

FIG. 16B



Quality of the print depends on the quality of the washing protocol

FIG. 16C



Most optimized process for phosphonation, alignment, washing and drying

FIG. 16D

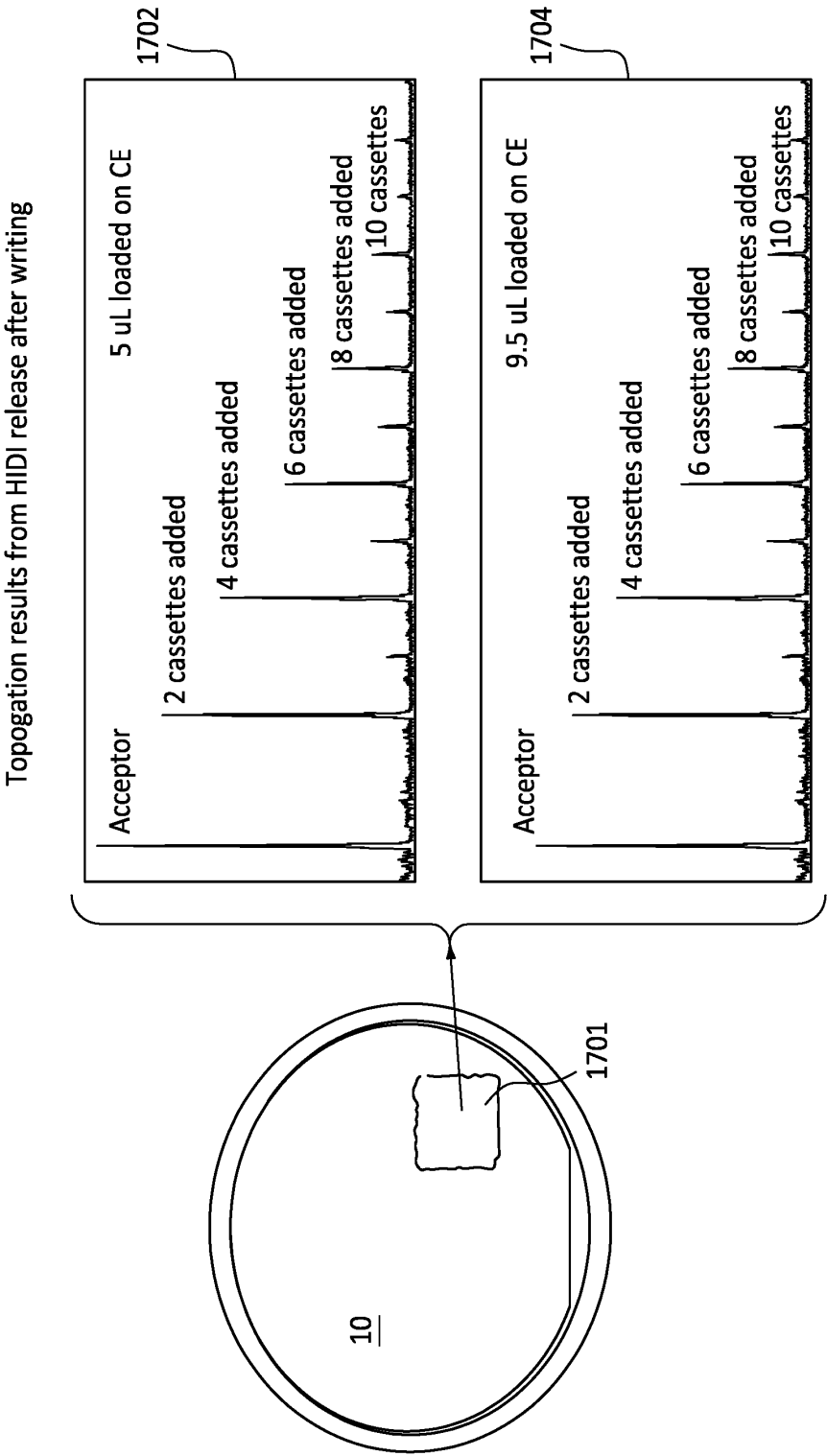


FIG. 17A

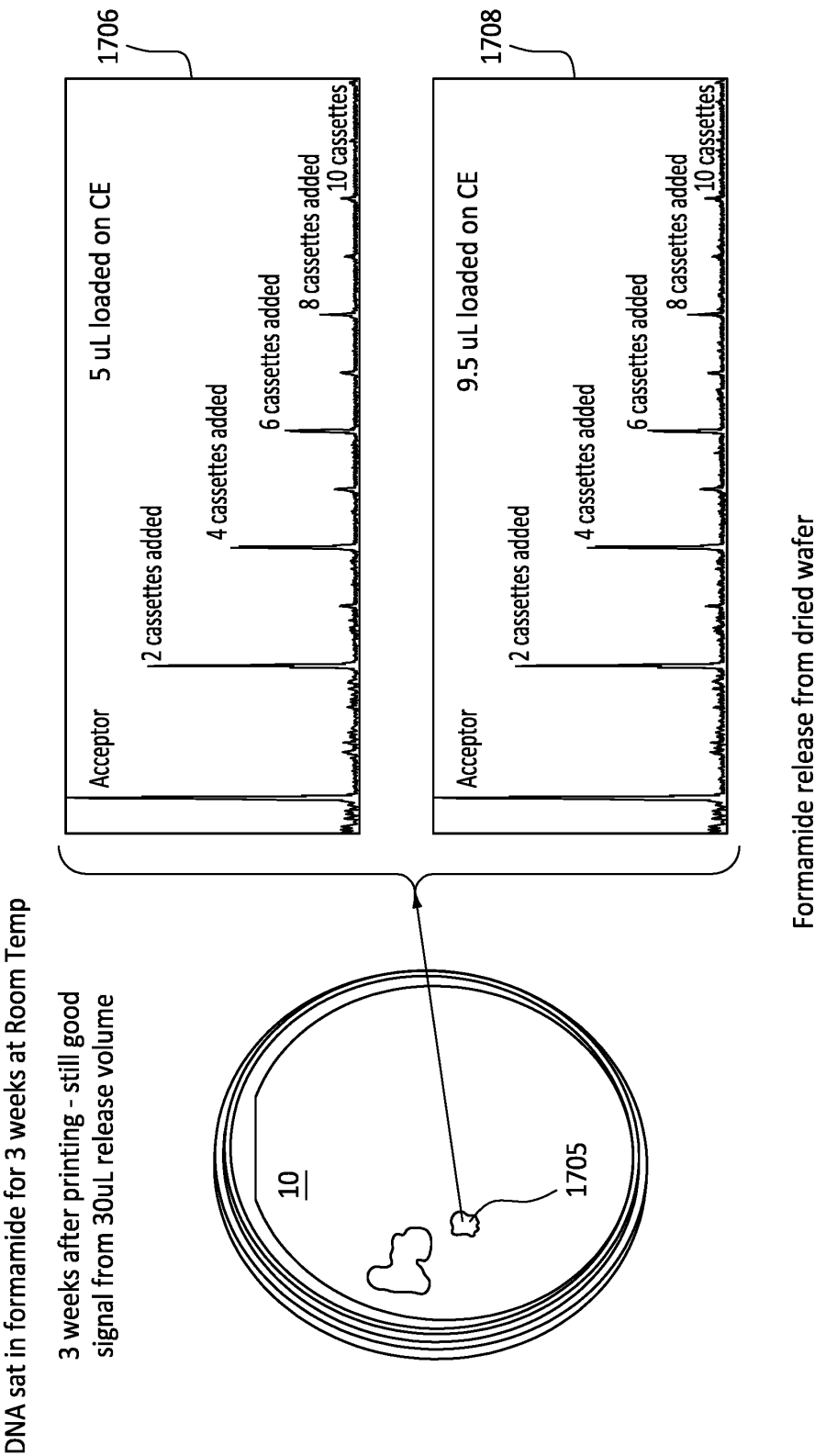


FIG. 17B

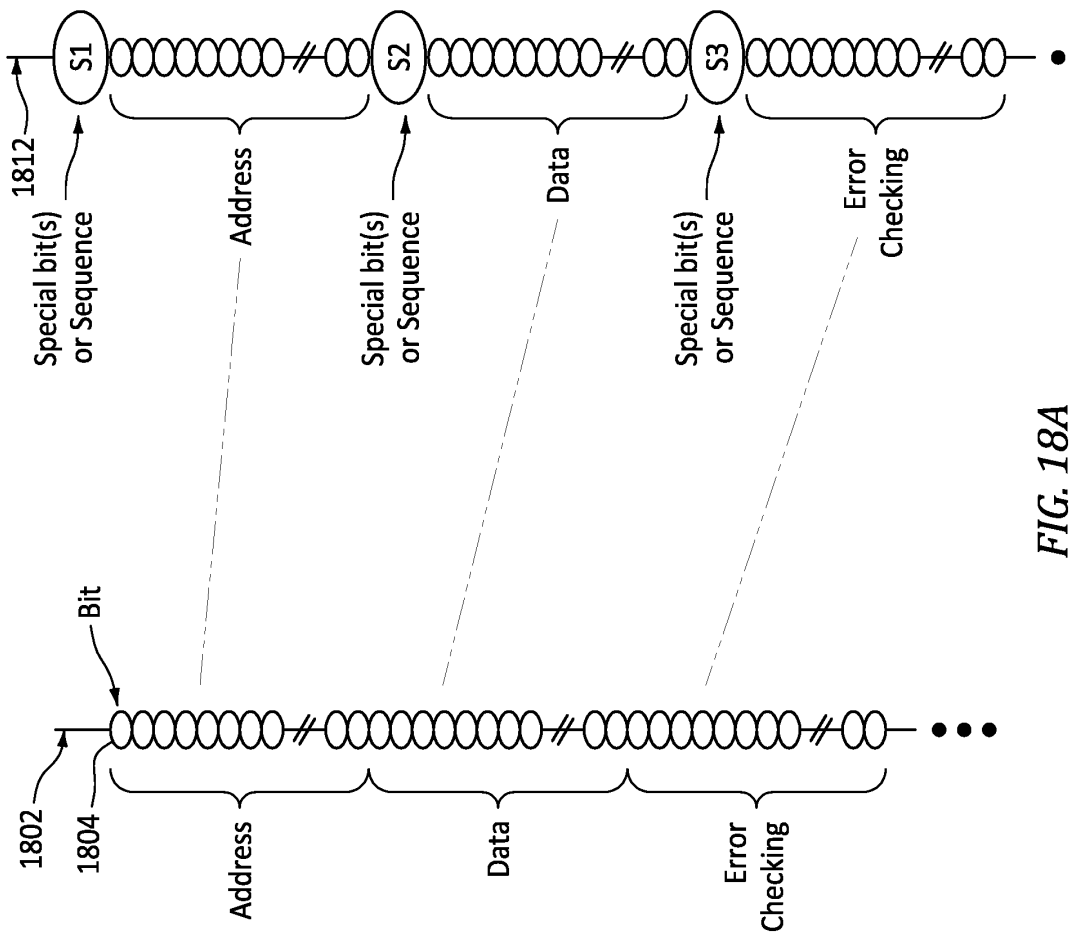
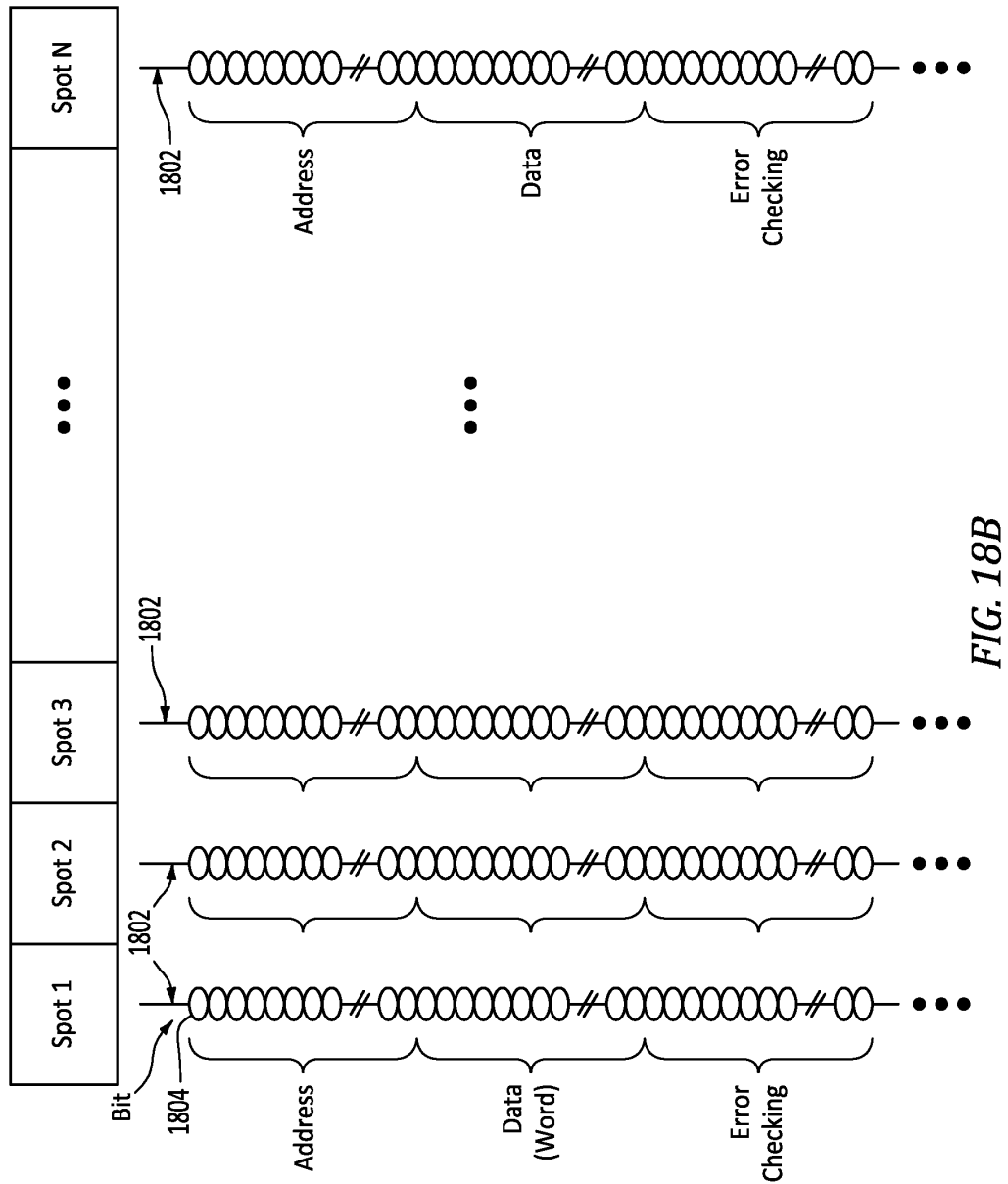


FIG. 18A



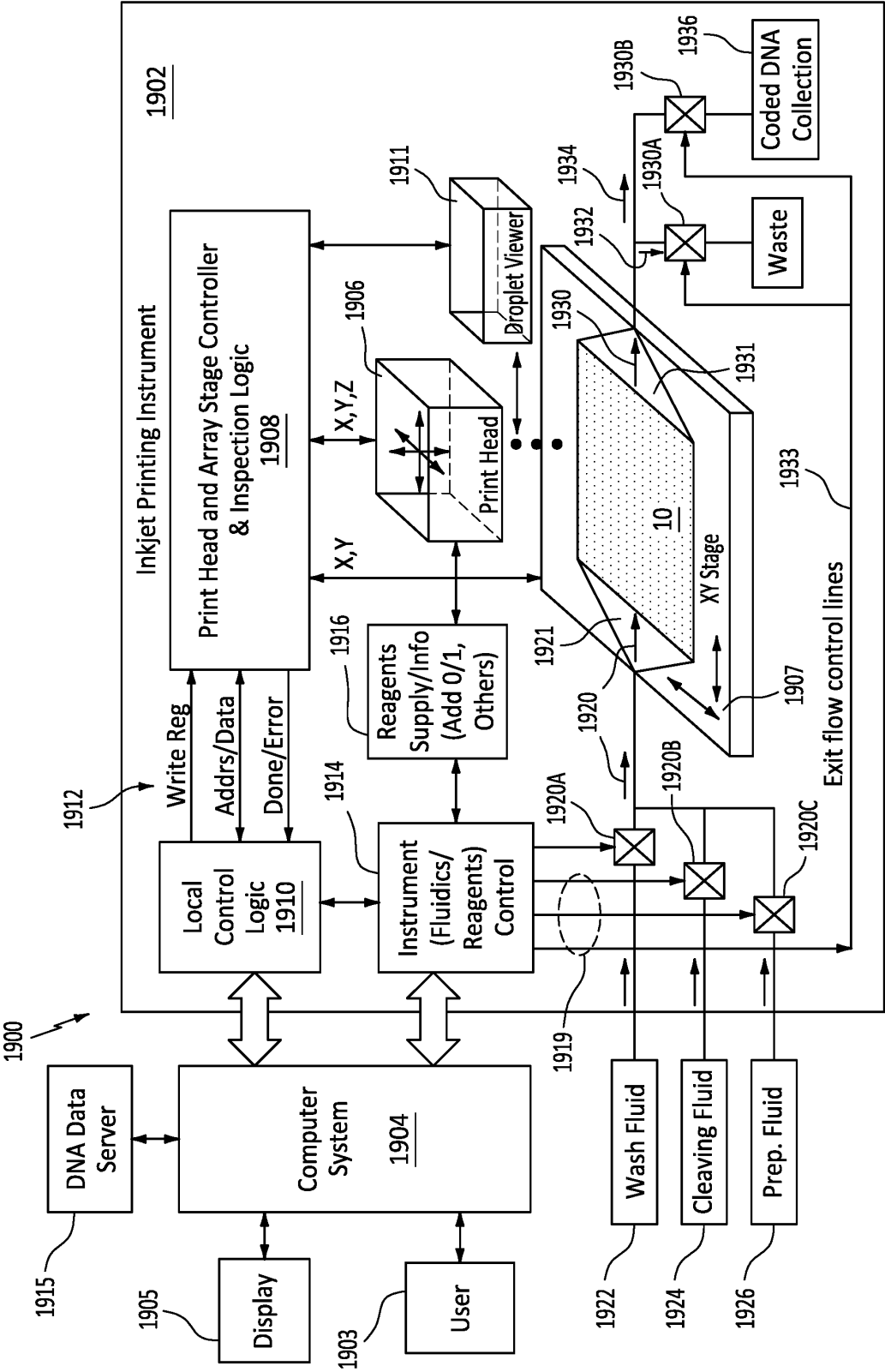


FIG. 19A

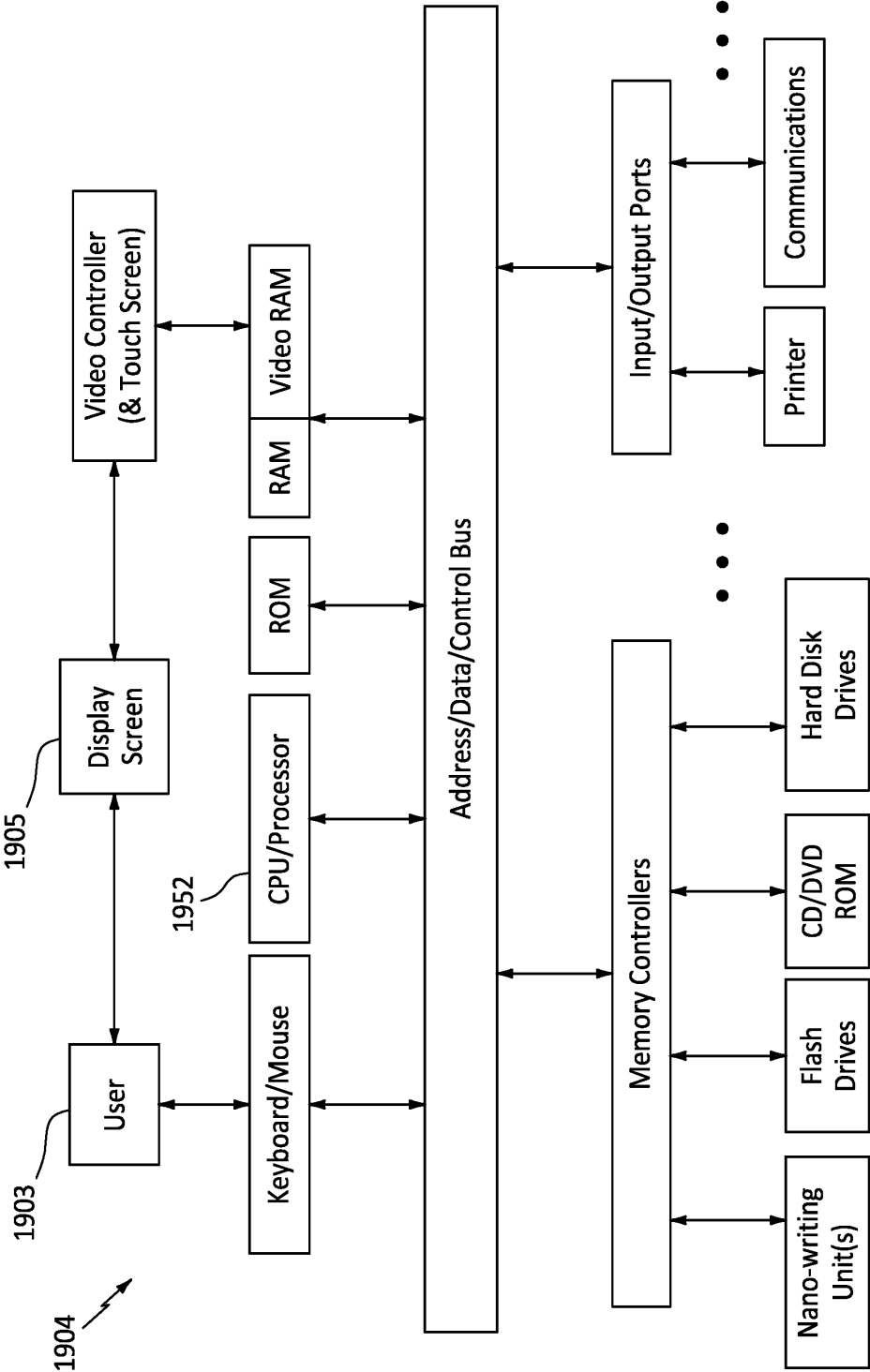
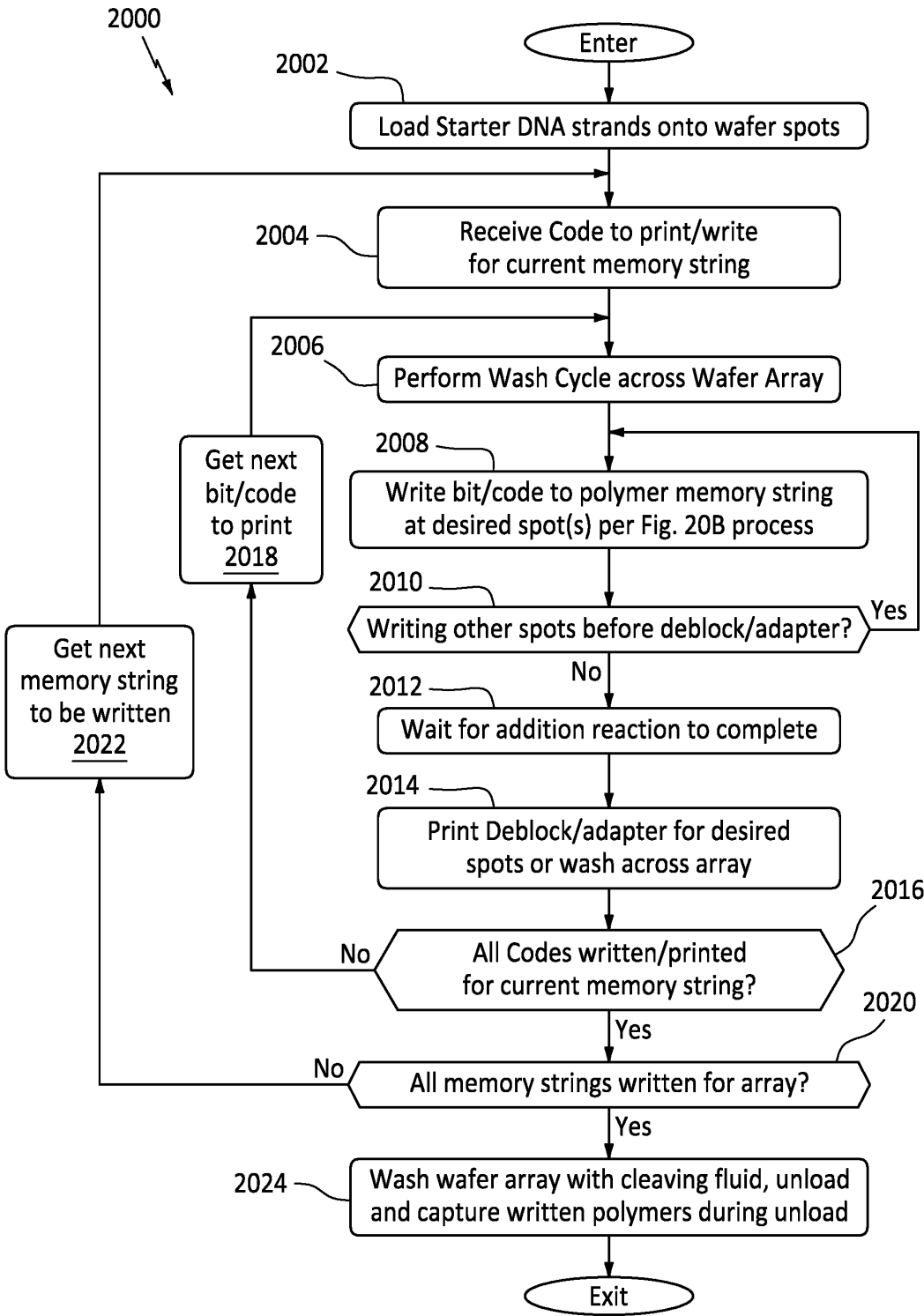
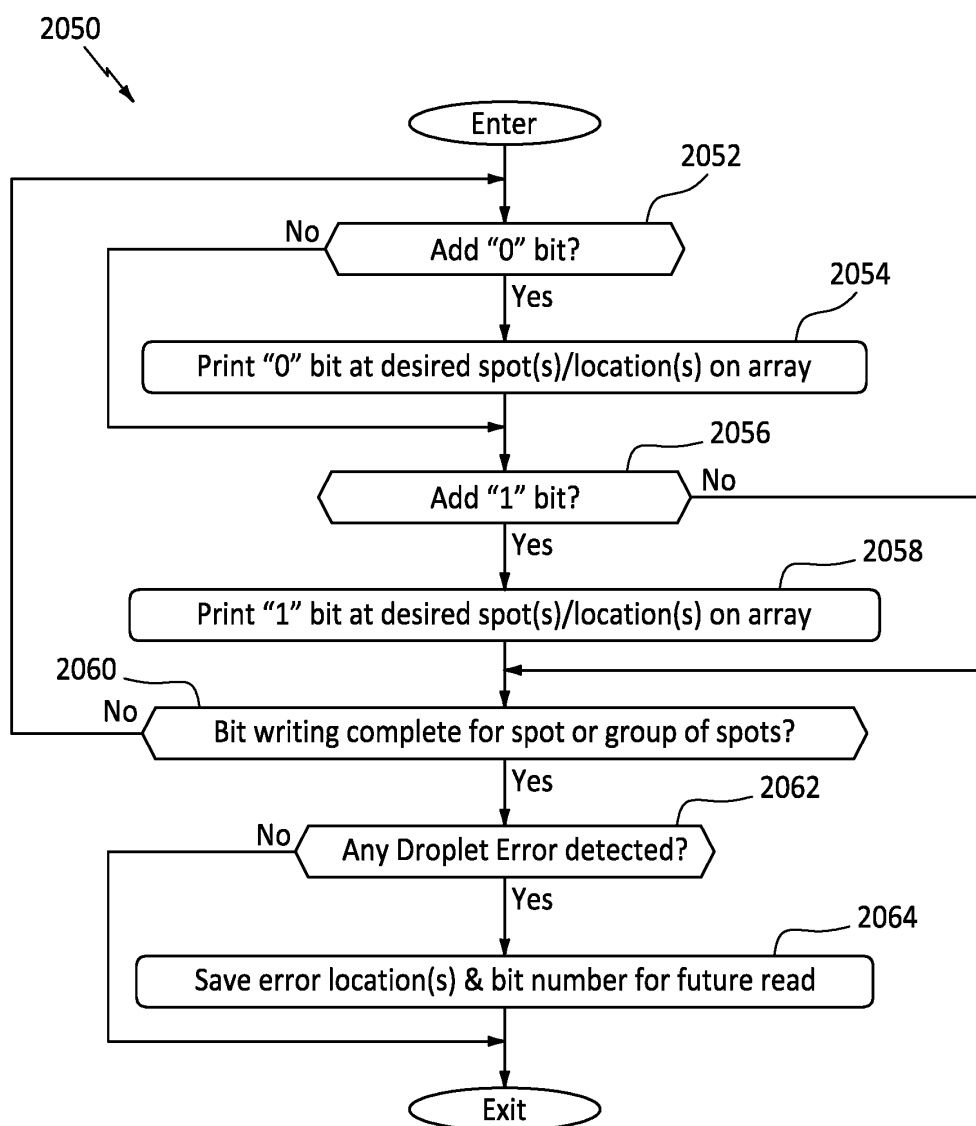


FIG. 19B



Writing (Printing) & Unloading Coded Polymer

FIG. 20A



Writing (Printing) Code to Polymer

FIG. 20B

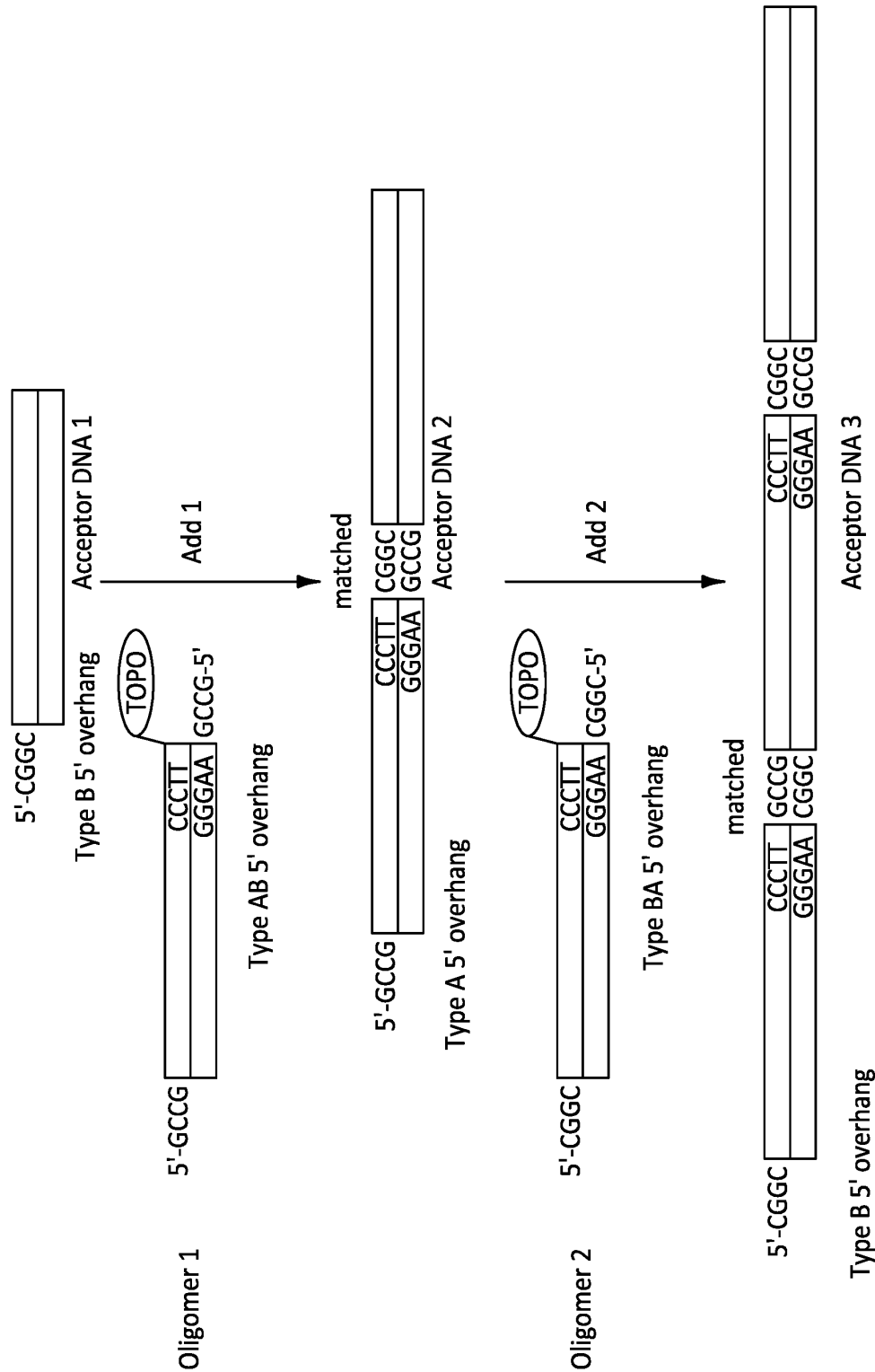


FIG. 21

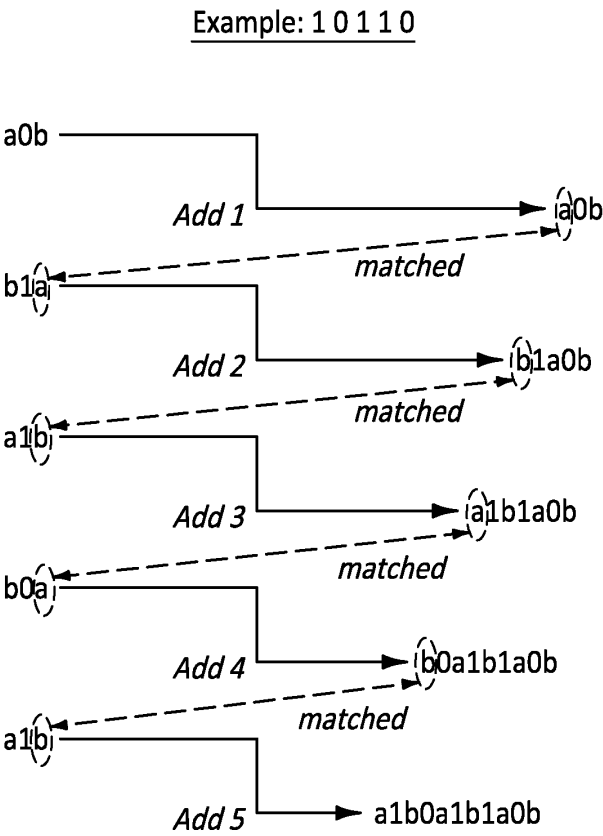


FIG. 22

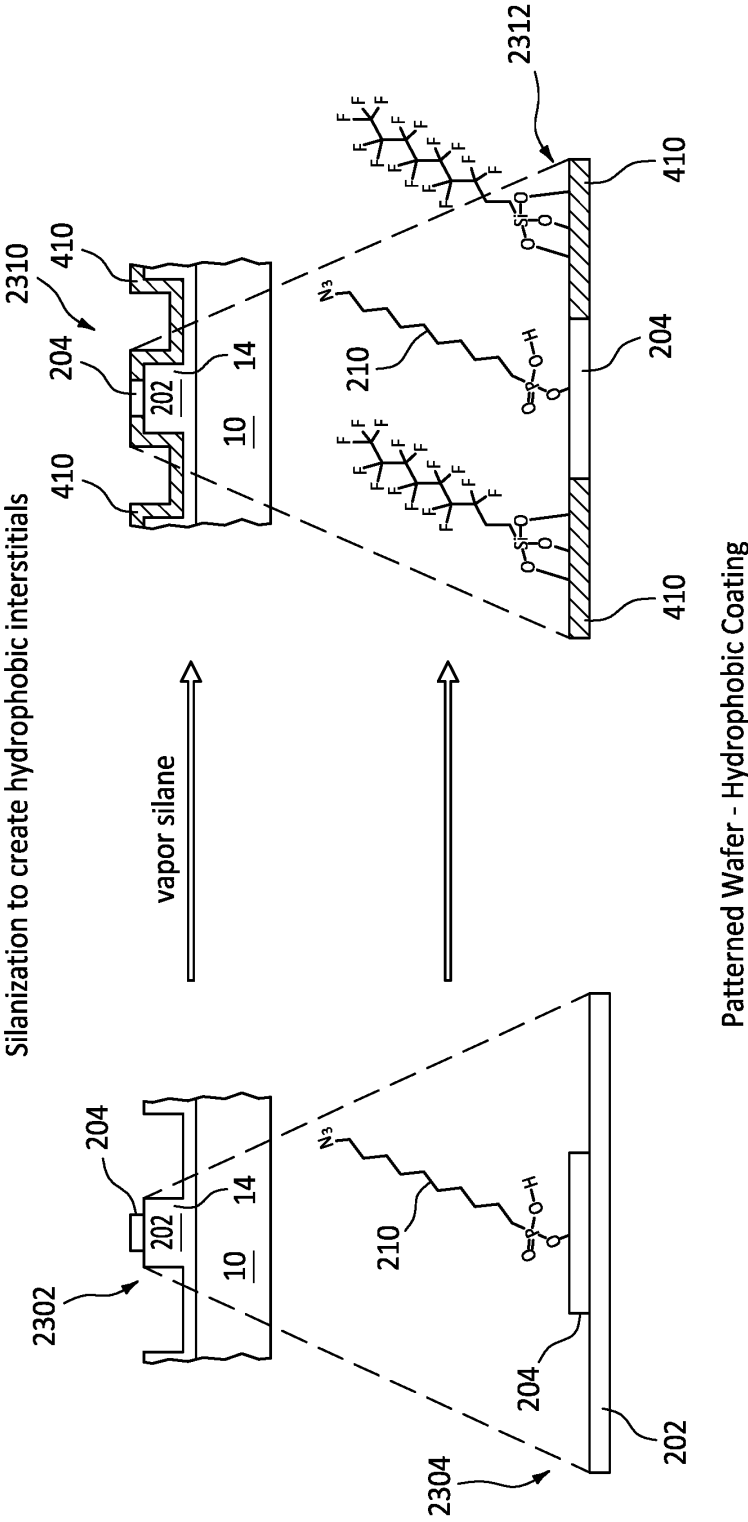
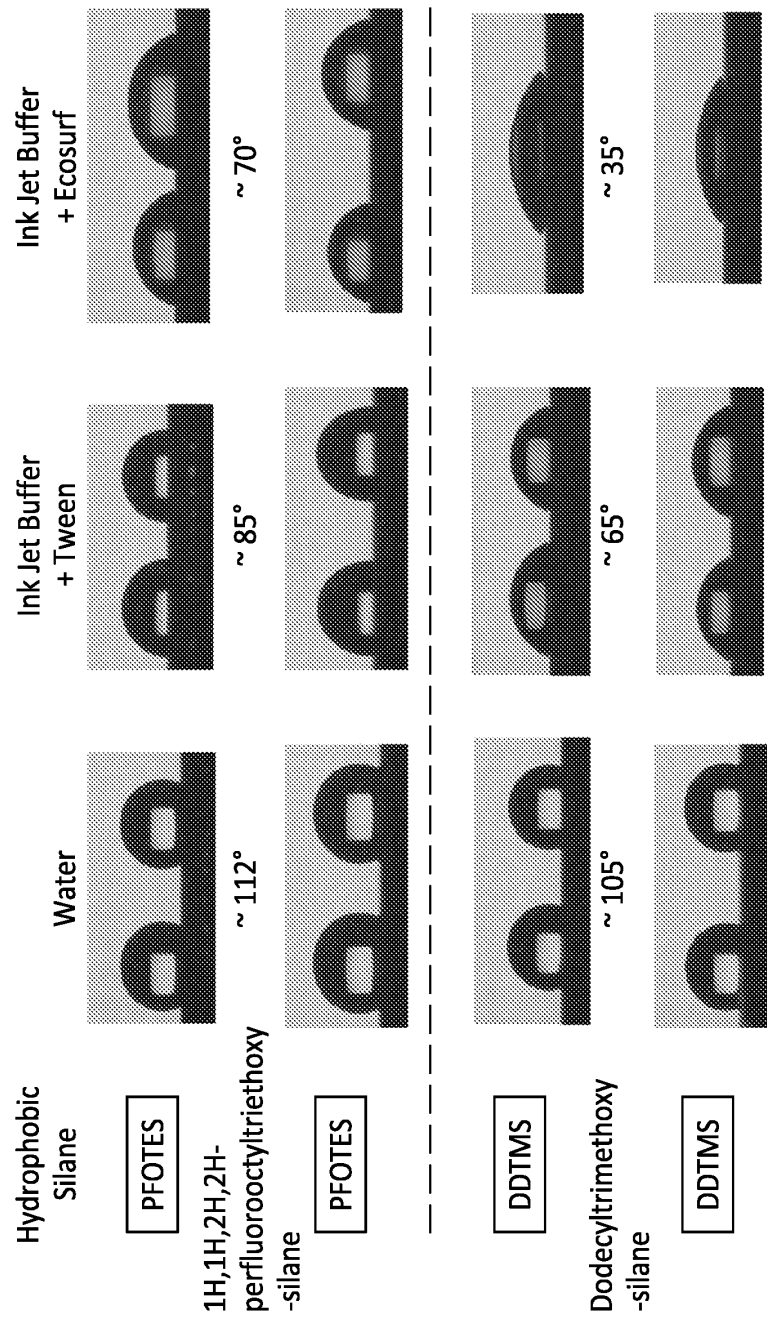


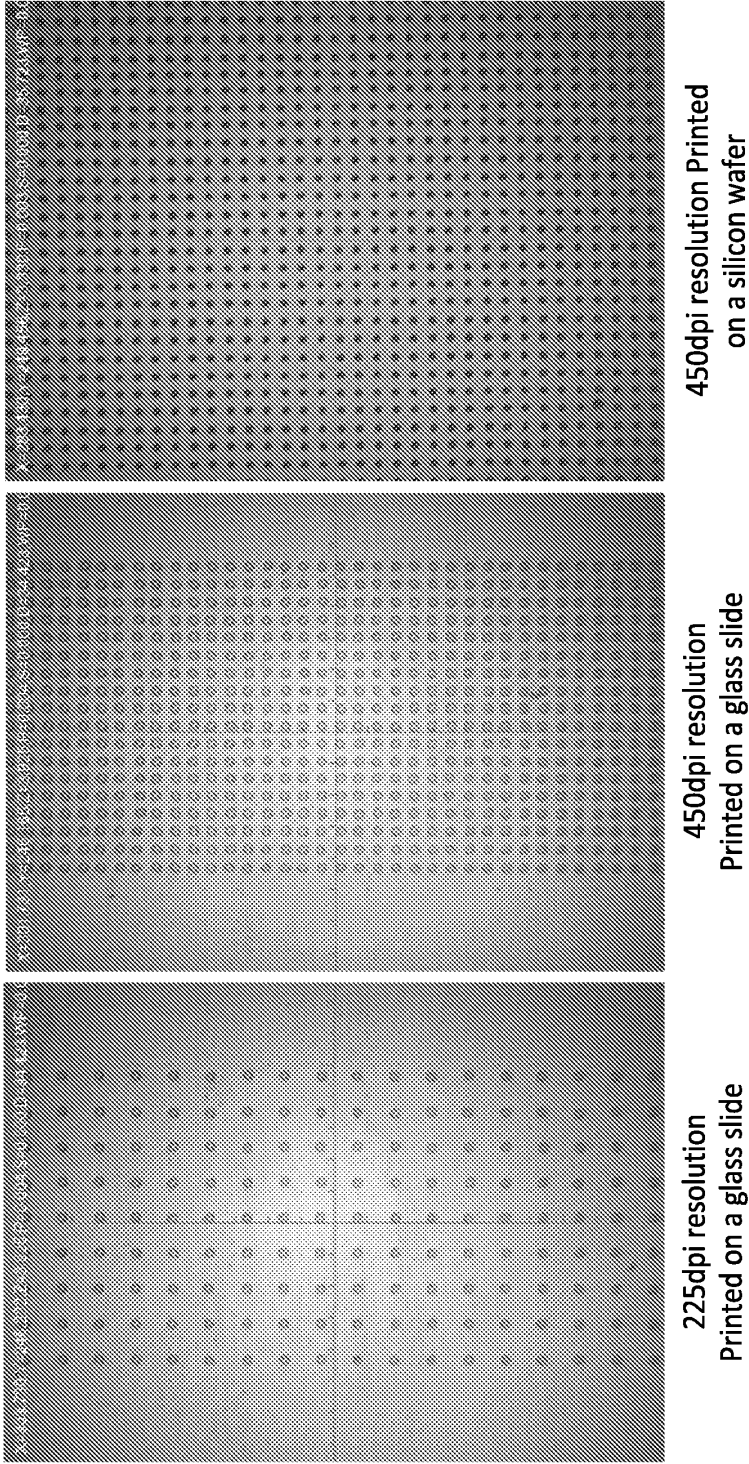
FIG. 23A



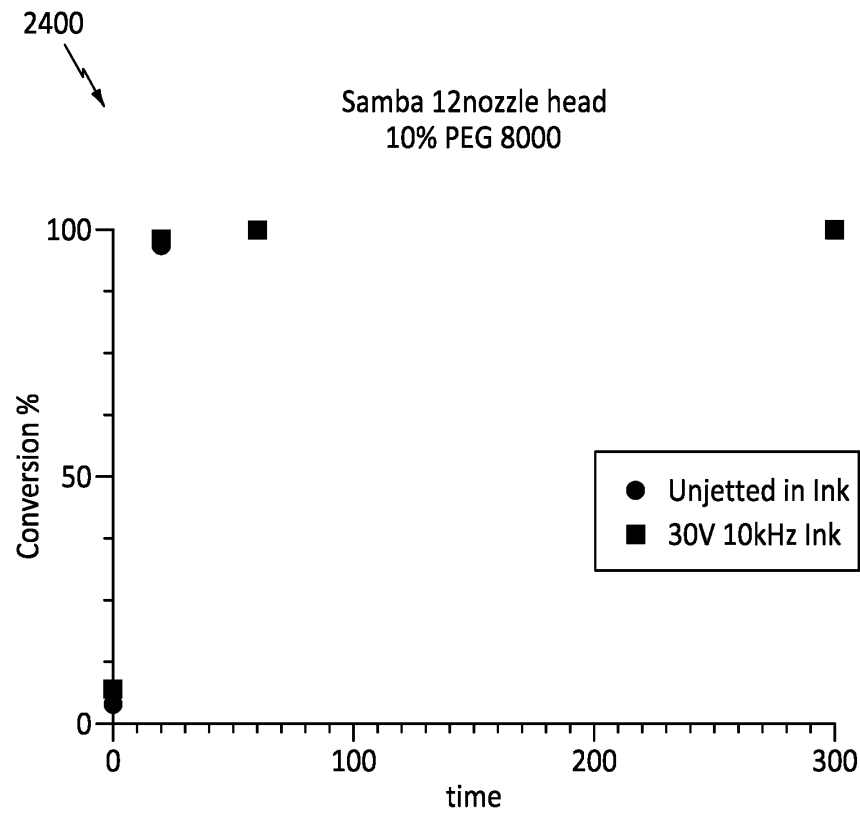
Patterned Wafer - Hydrophobic Coating

FIG. 23B

Images of Topoisomerase-based ink printed with 10kHz frequency, 28V pulse with 40V/us slew rate on a glass slide and a clean 4-inch diameter silicon wafer



Example 1 - Printing Topoisomerase-based Ink
FIG. 24A



Example 1 - Printing Topoisomerase-based Ink

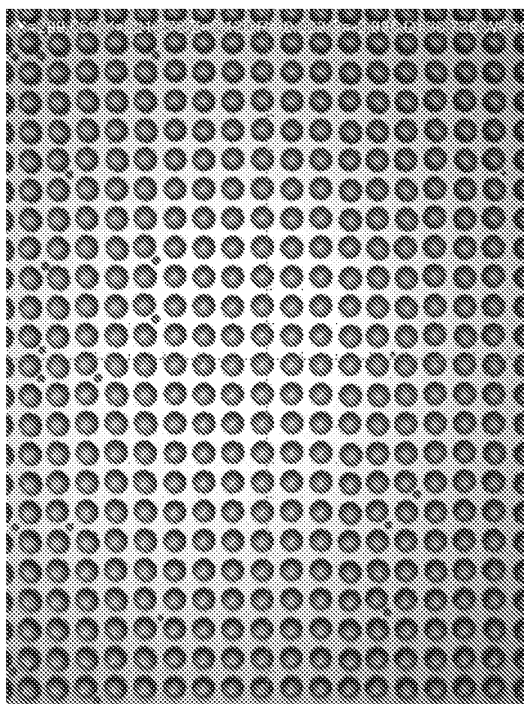
FIG. 24B

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2500



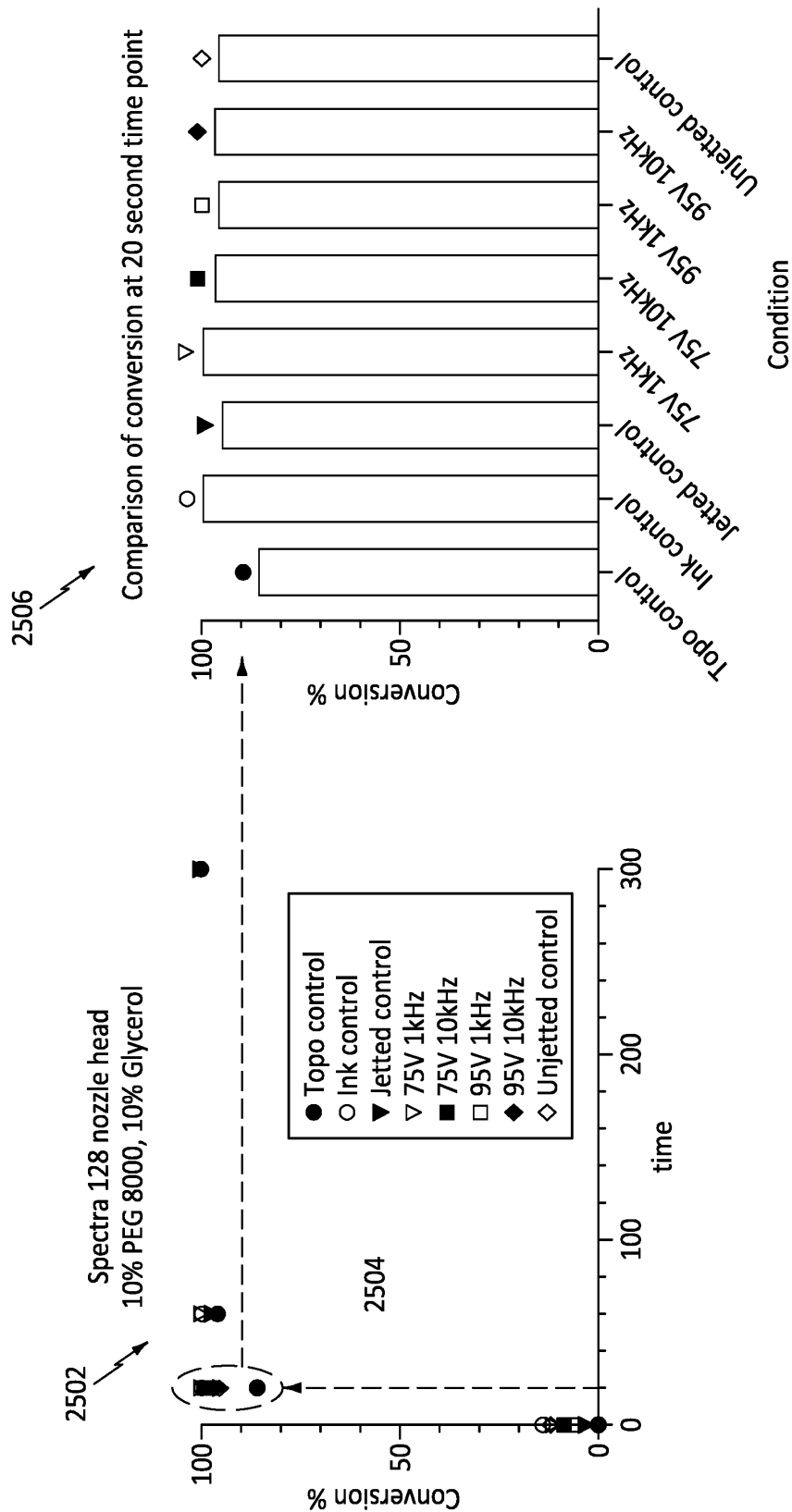
Images of Topoisomerase-based ink printed with 10kHz frequency,
75V pulse a clean 4-inch diameter silicon wafer



300dpi resolution, 85um pitch
Printed on a clean silicon wafer

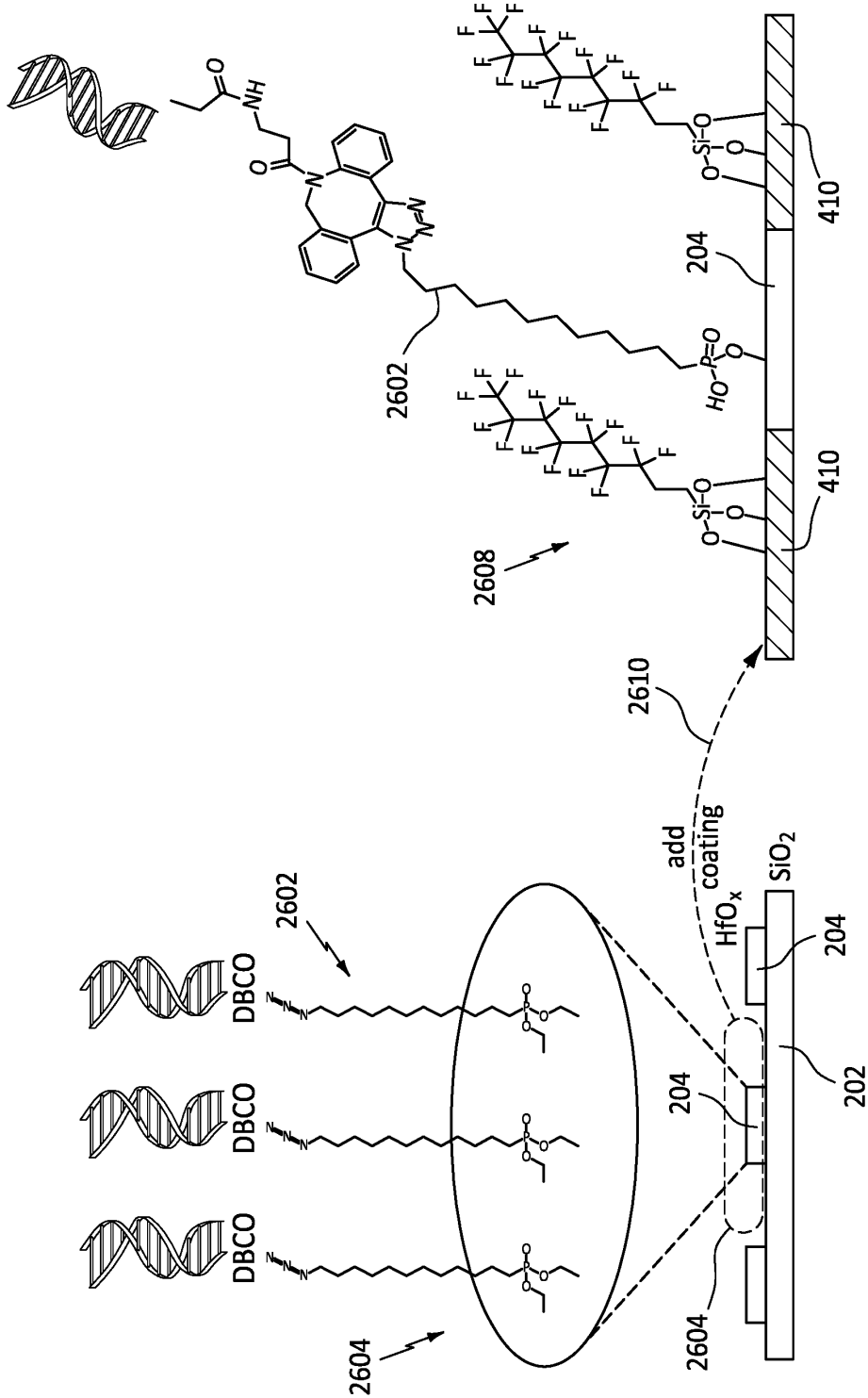
Example 2 - Printing Topoisomerase-based Ink

FIG. 25A



Example 2 - Printing Topoisomerase-based Ink

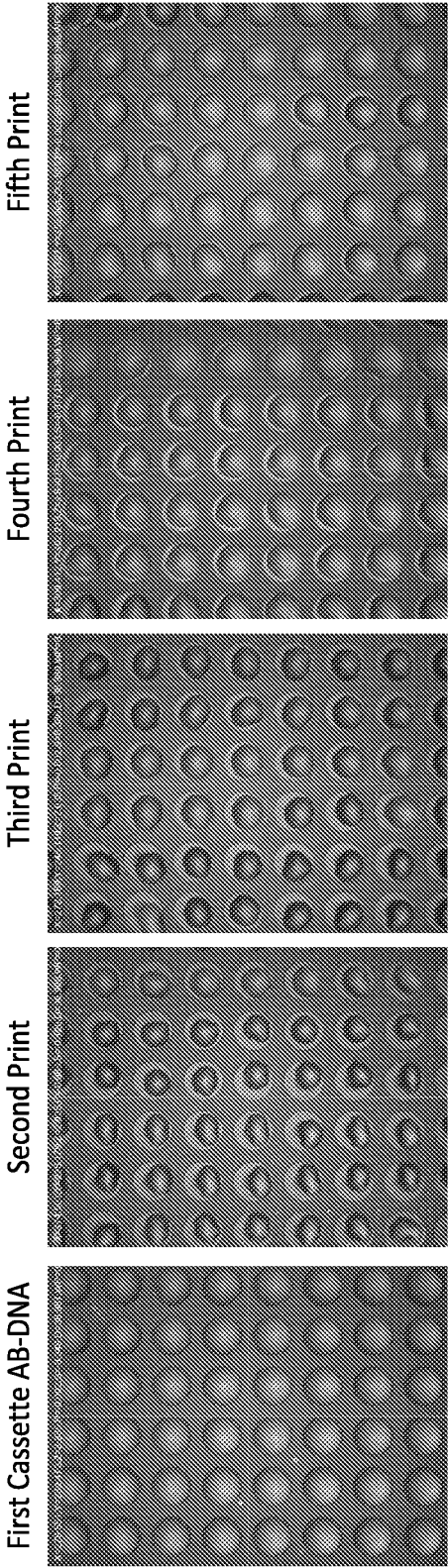
FIG. 25B



Example 3 - Printing Topoisomerase Ink on a patterned wafer

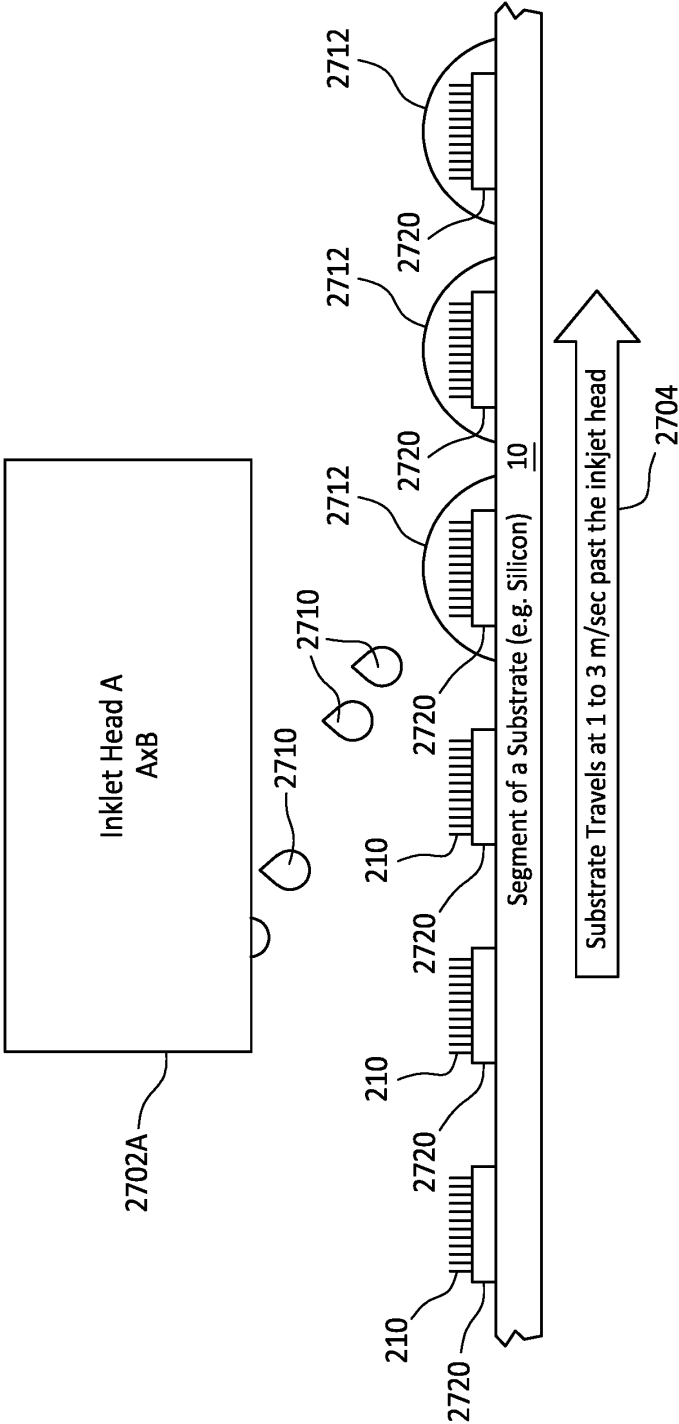
FIG. 26A

2600 ↗



Example 3 - Consecutive images from a cycle of 5 printing

FIG. 26B



Substrate moves quickly under stationary inkjet heads

FIG. 27A

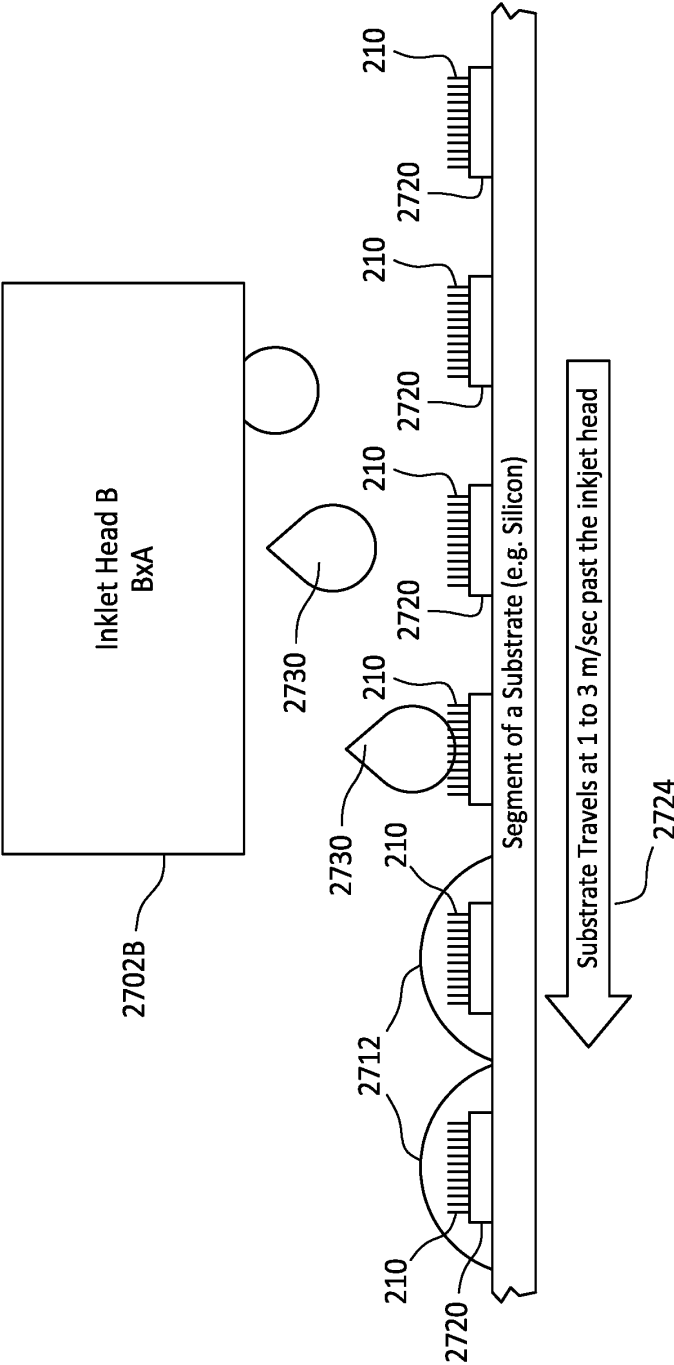
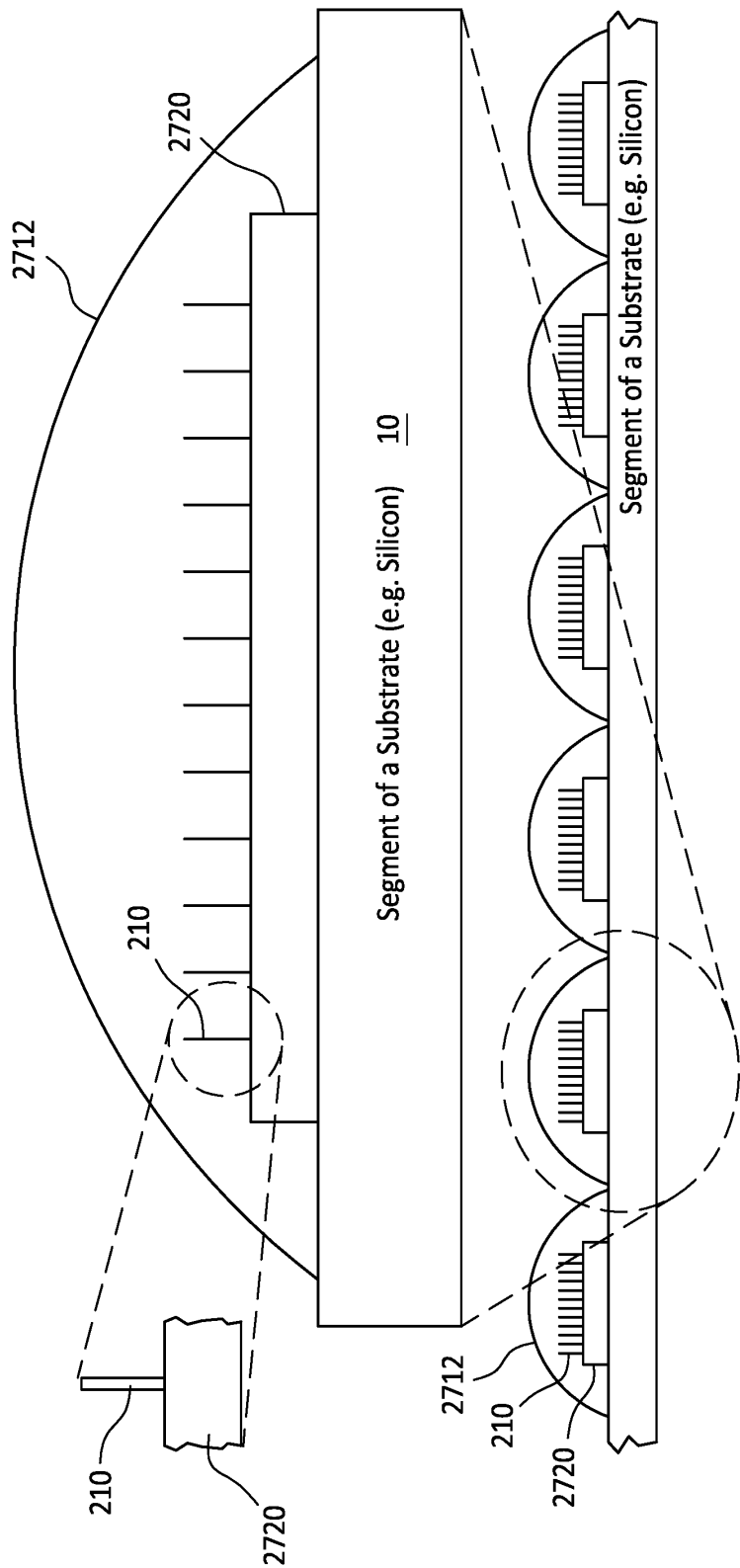
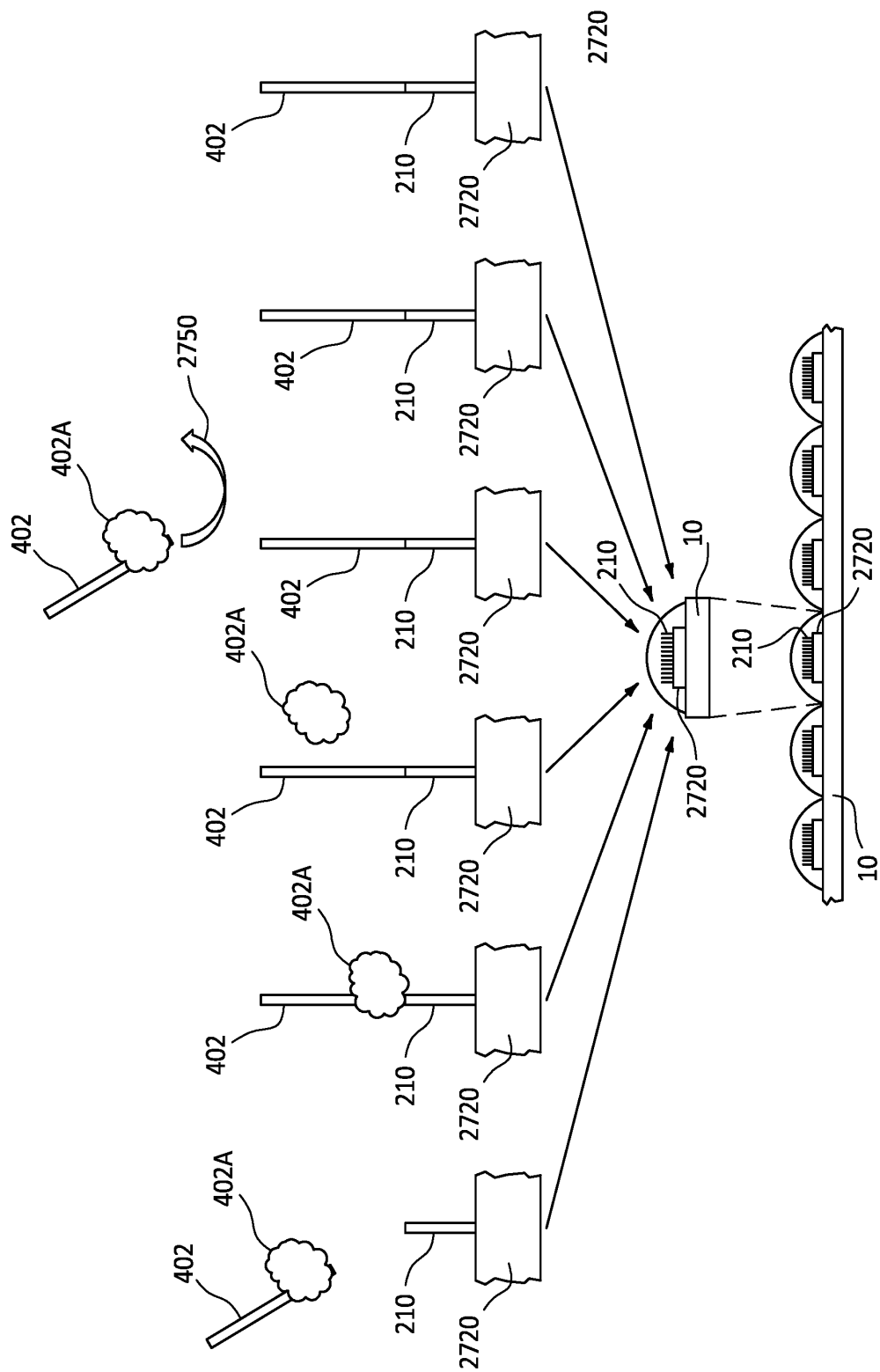


FIG. 27B



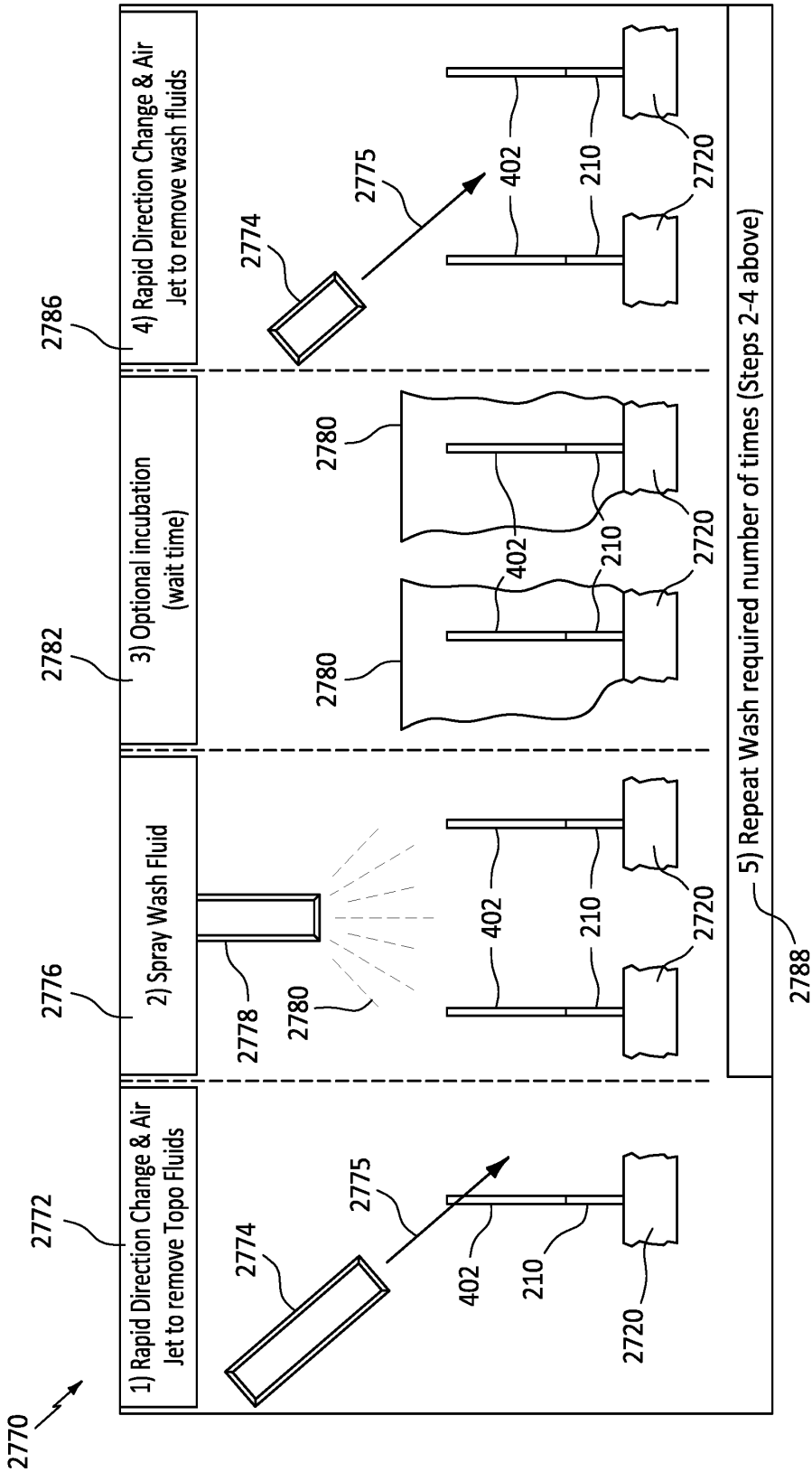
Can adjust the Acceptor density by the chemistry used

FIG. 27C



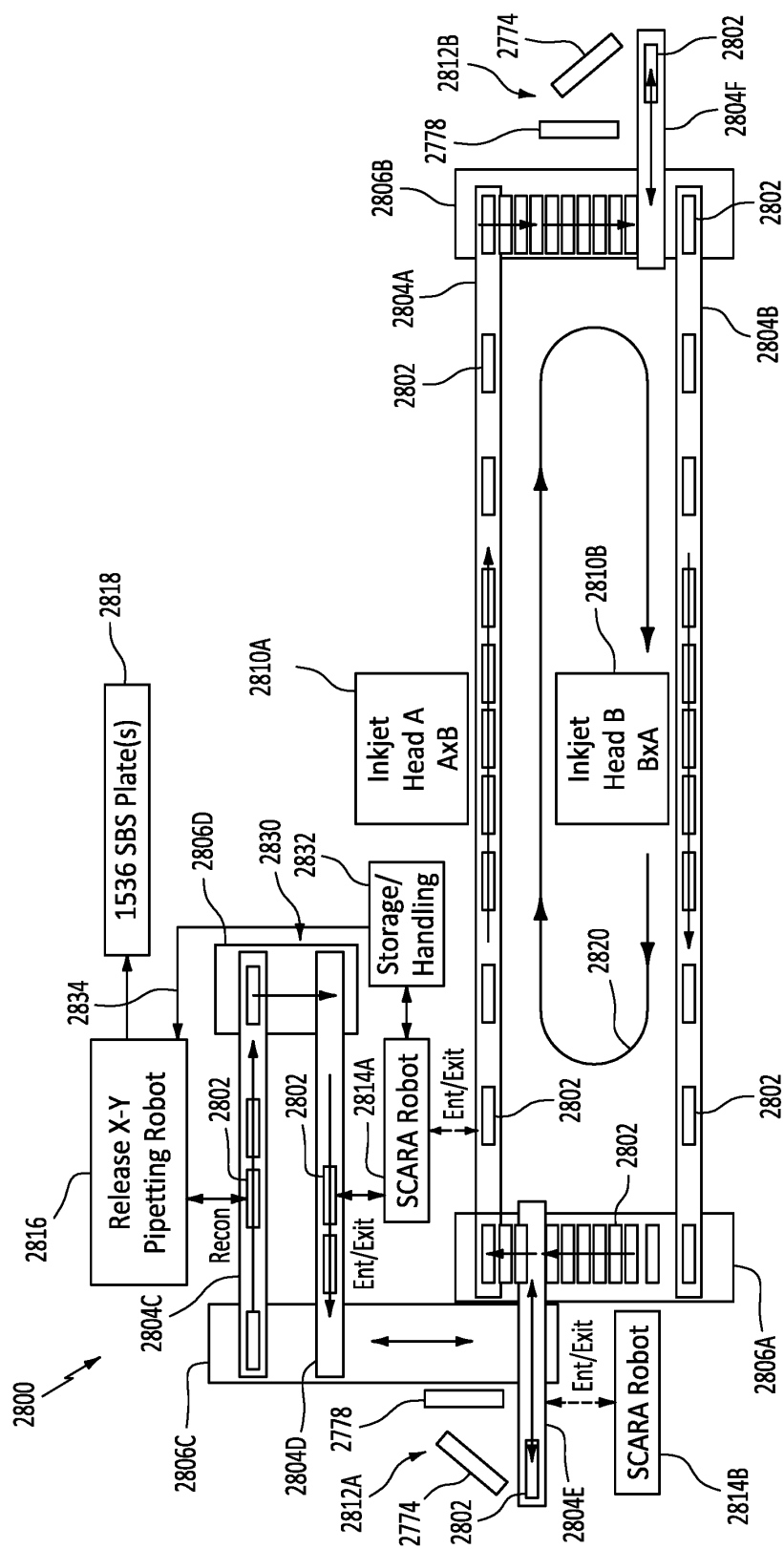
Charge Topo in Solution → Reacts → Releases → Polymerization does not occur

FIG. 27D



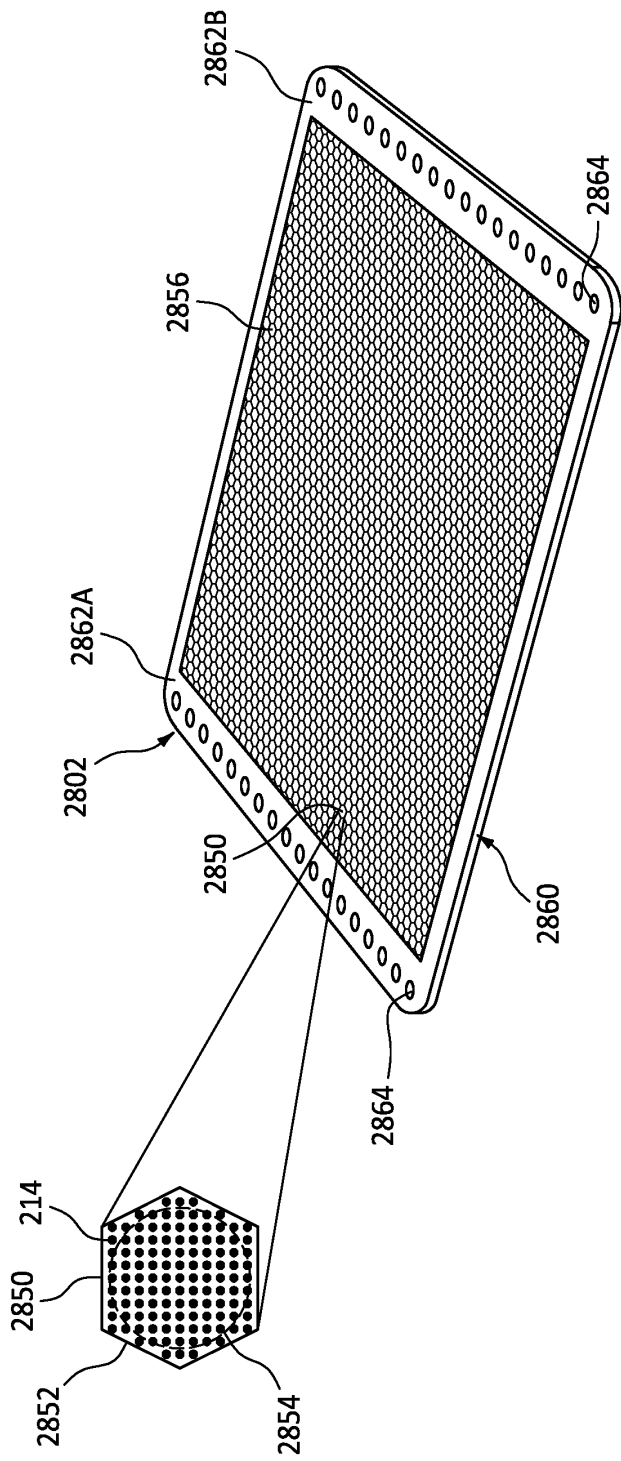
Potential Wash Cycle or Wash/Deblock Cycle

FIG. 27E



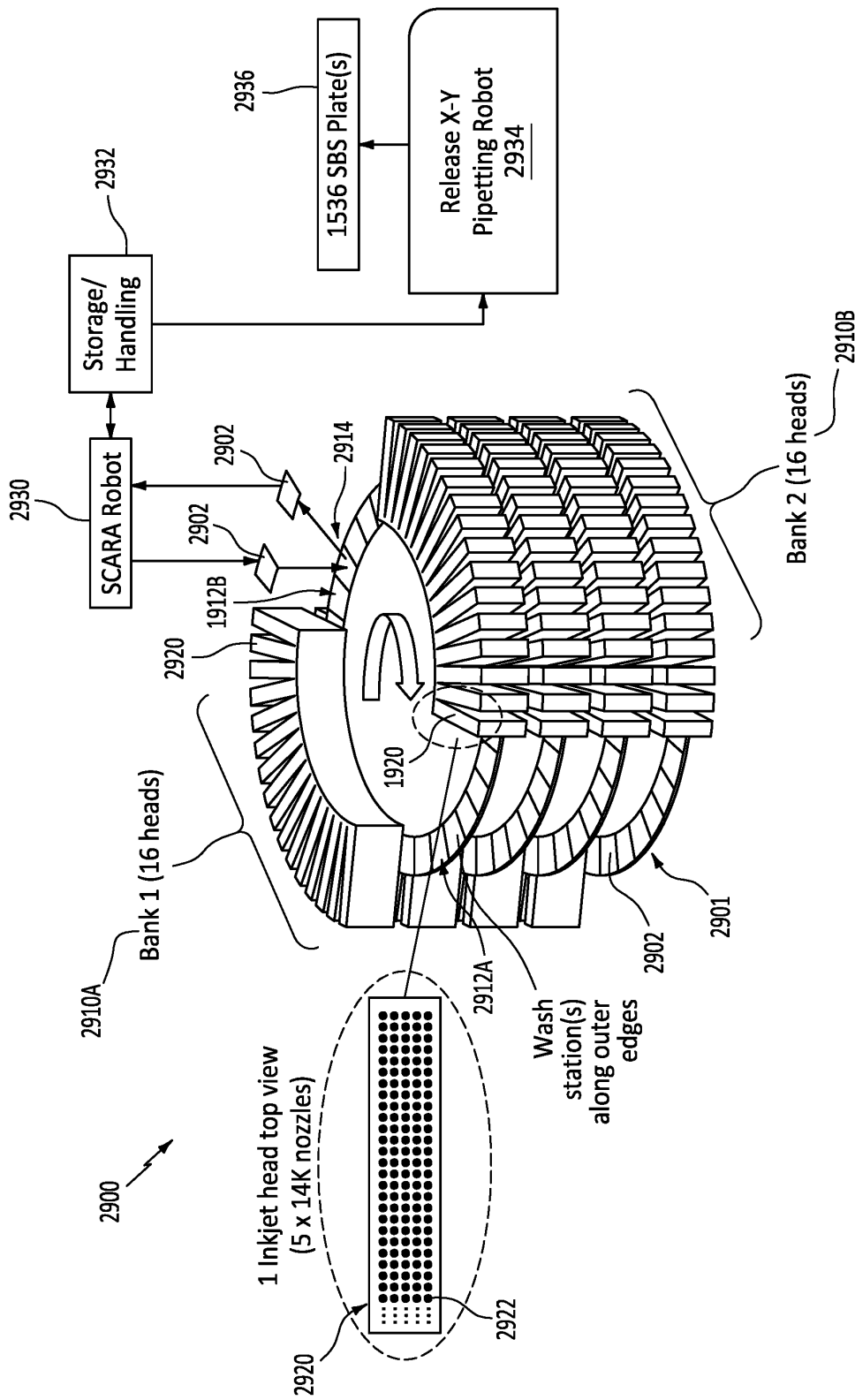
Conveyor Track Linear Actuator Writing System

FIG. 28A



Wafer Shuttle Design - Active area 210mm x 210mm

FIG. 28B



Turntable Design

FIG. 29

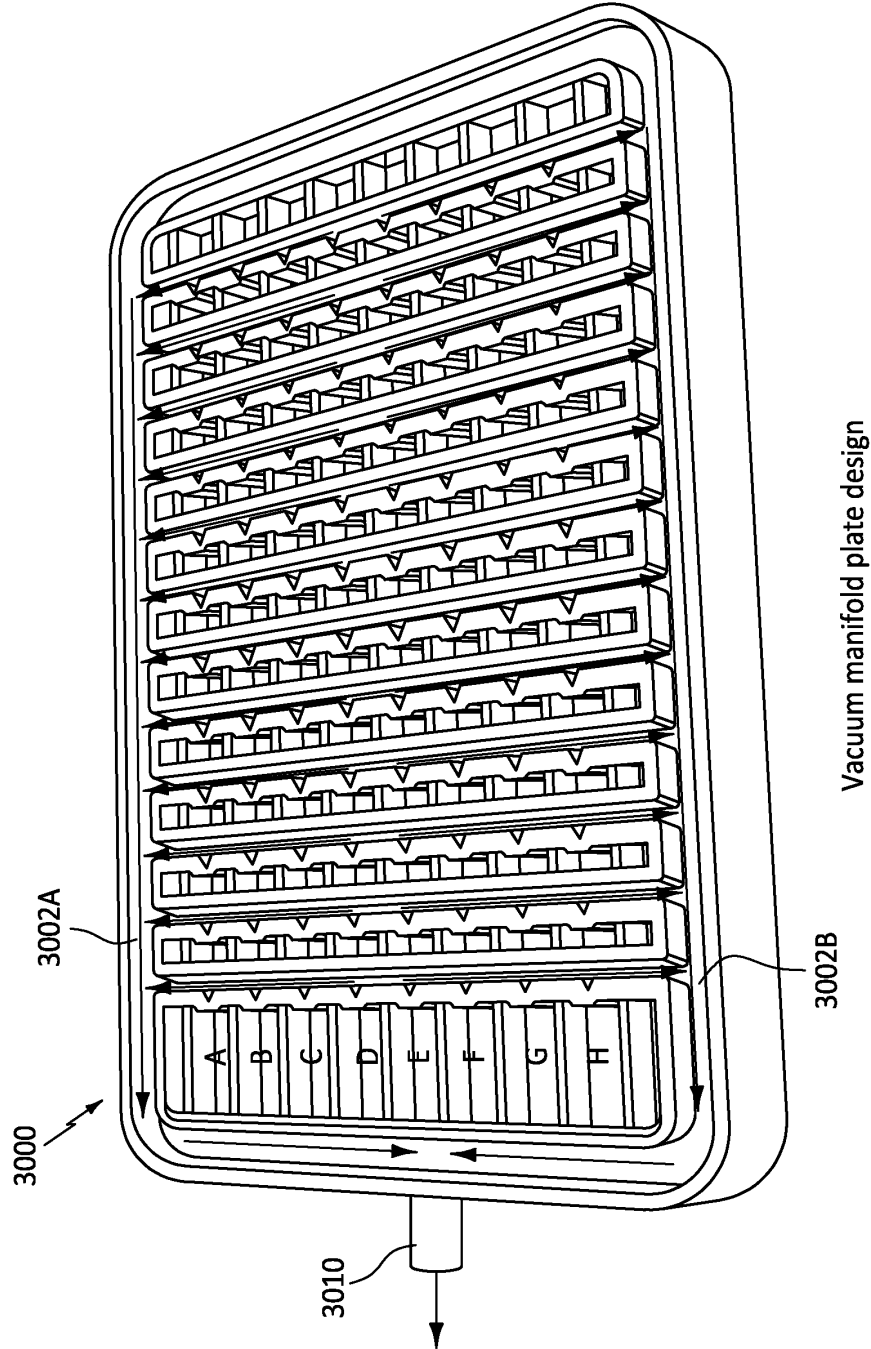


FIG. 30A

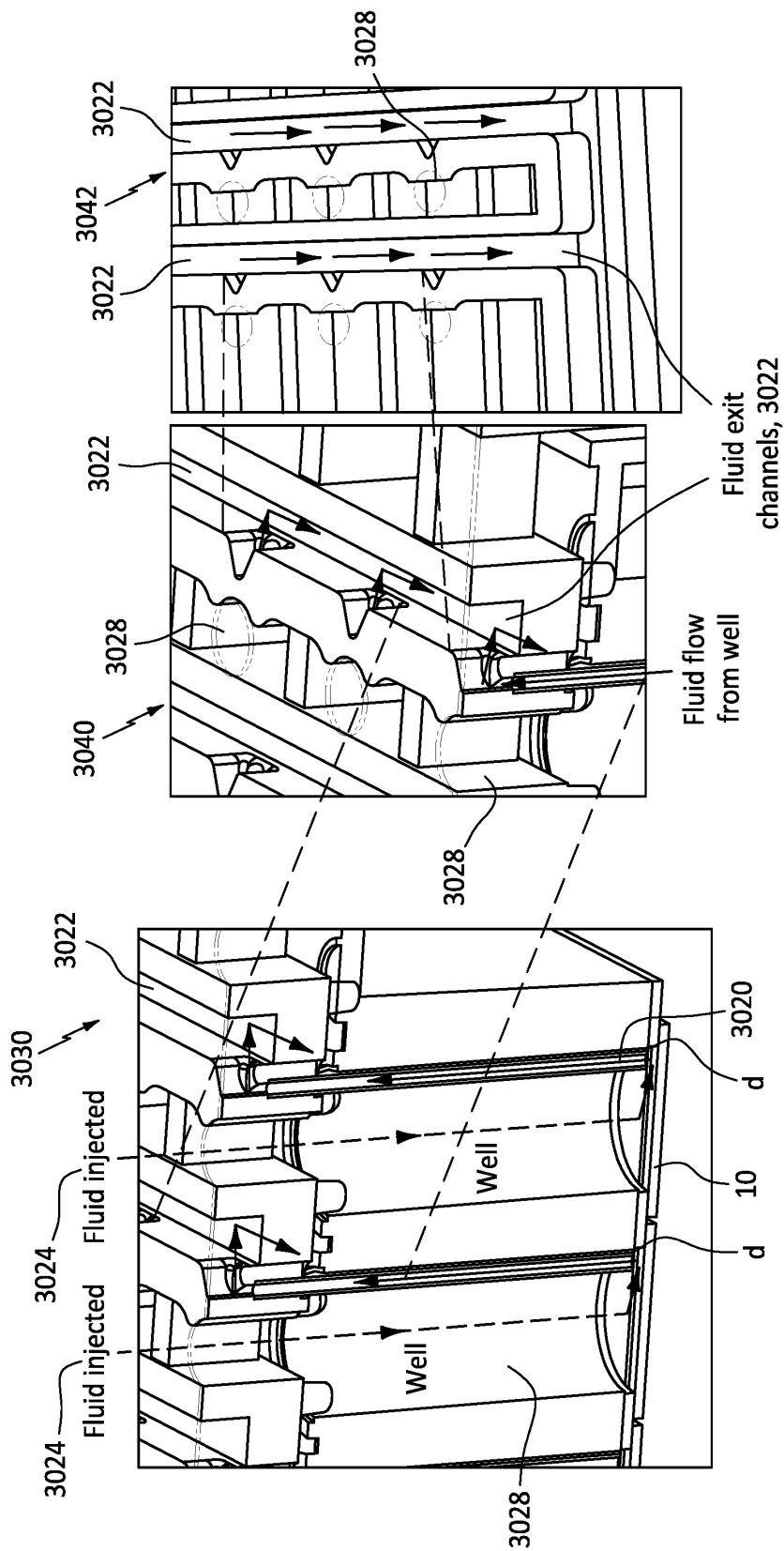
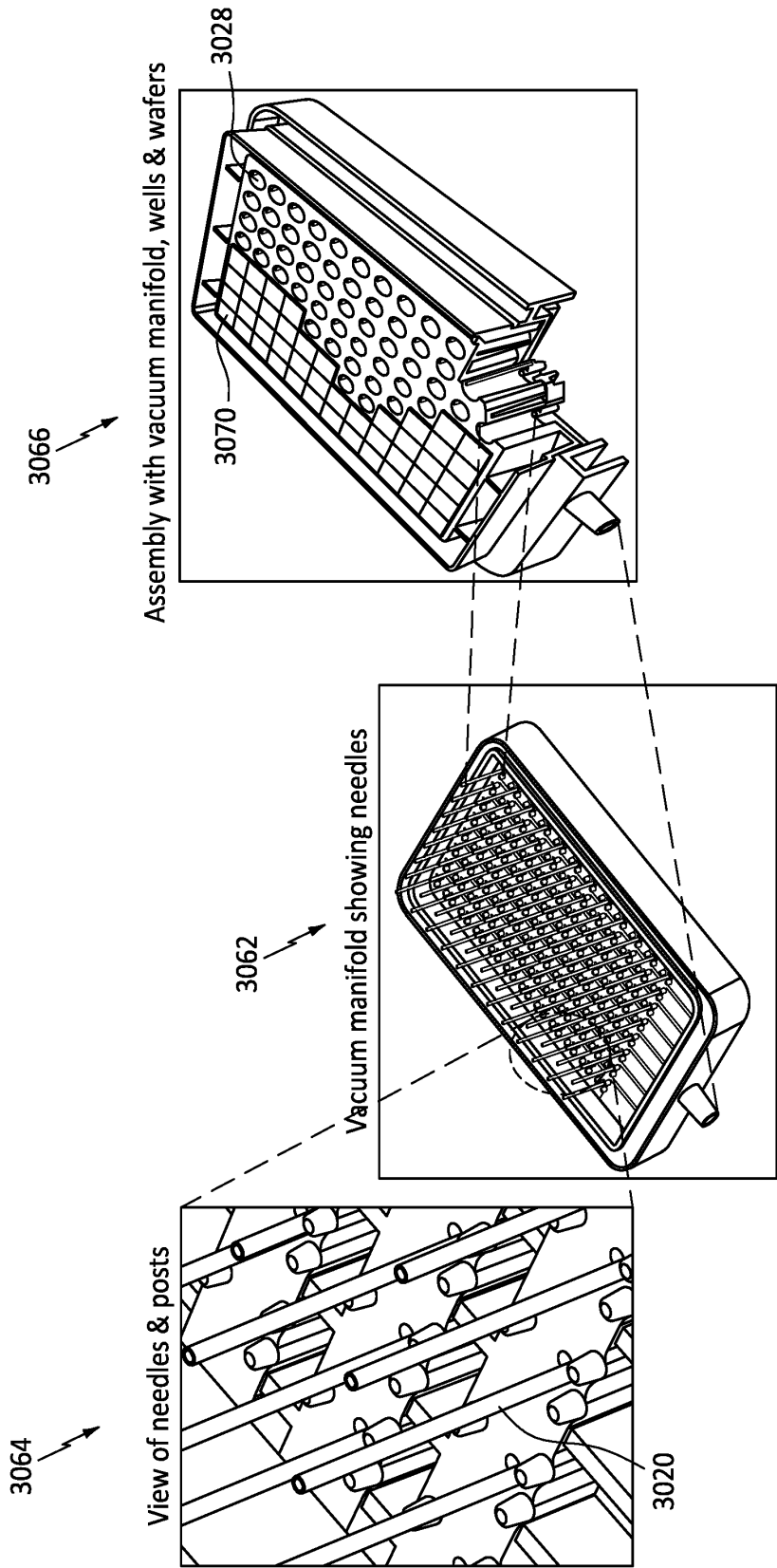


FIG. 30B

Vacuum Manifold with Fluid Wells



Vacuum Manifold Needles and Assembly

FIG. 30C

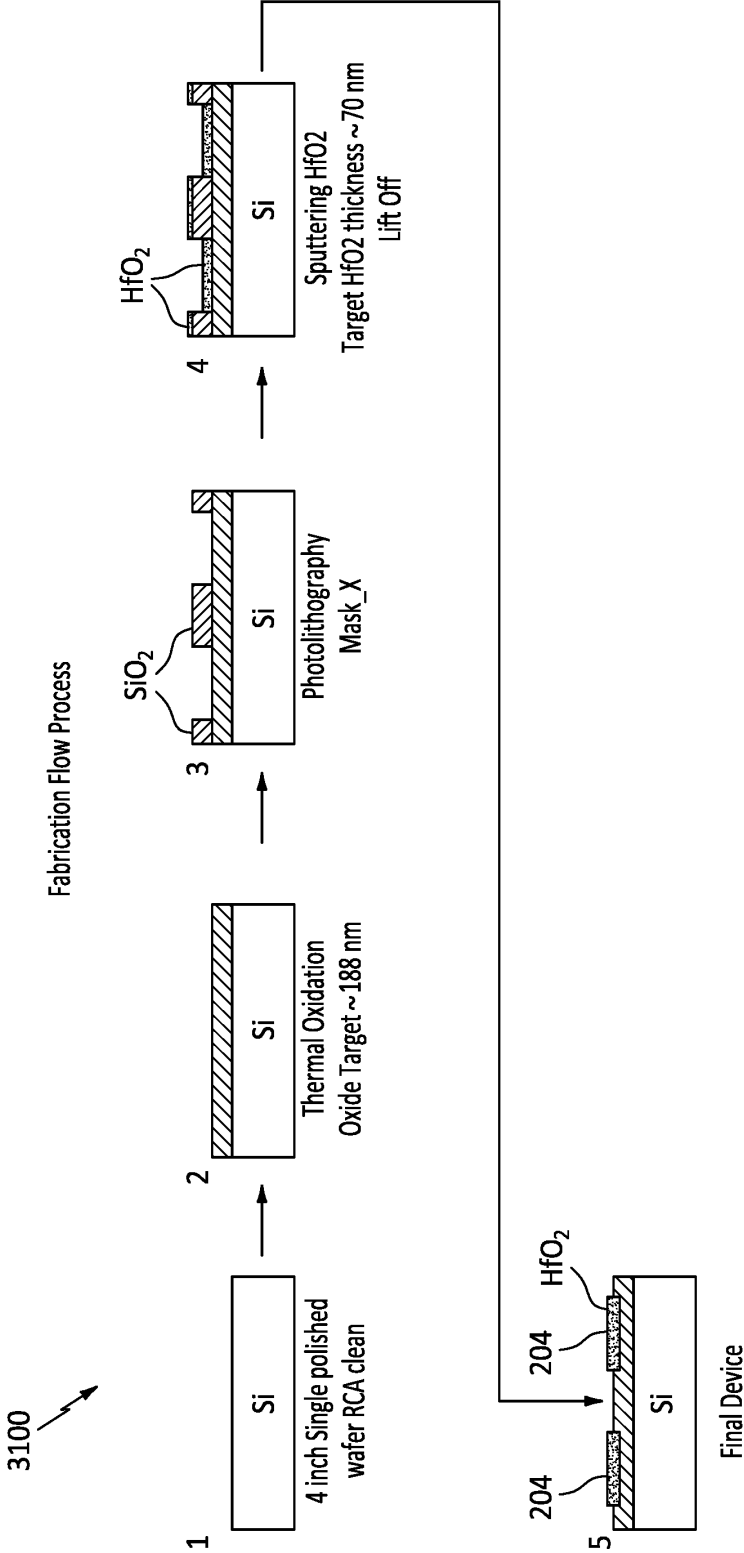


FIG. 31

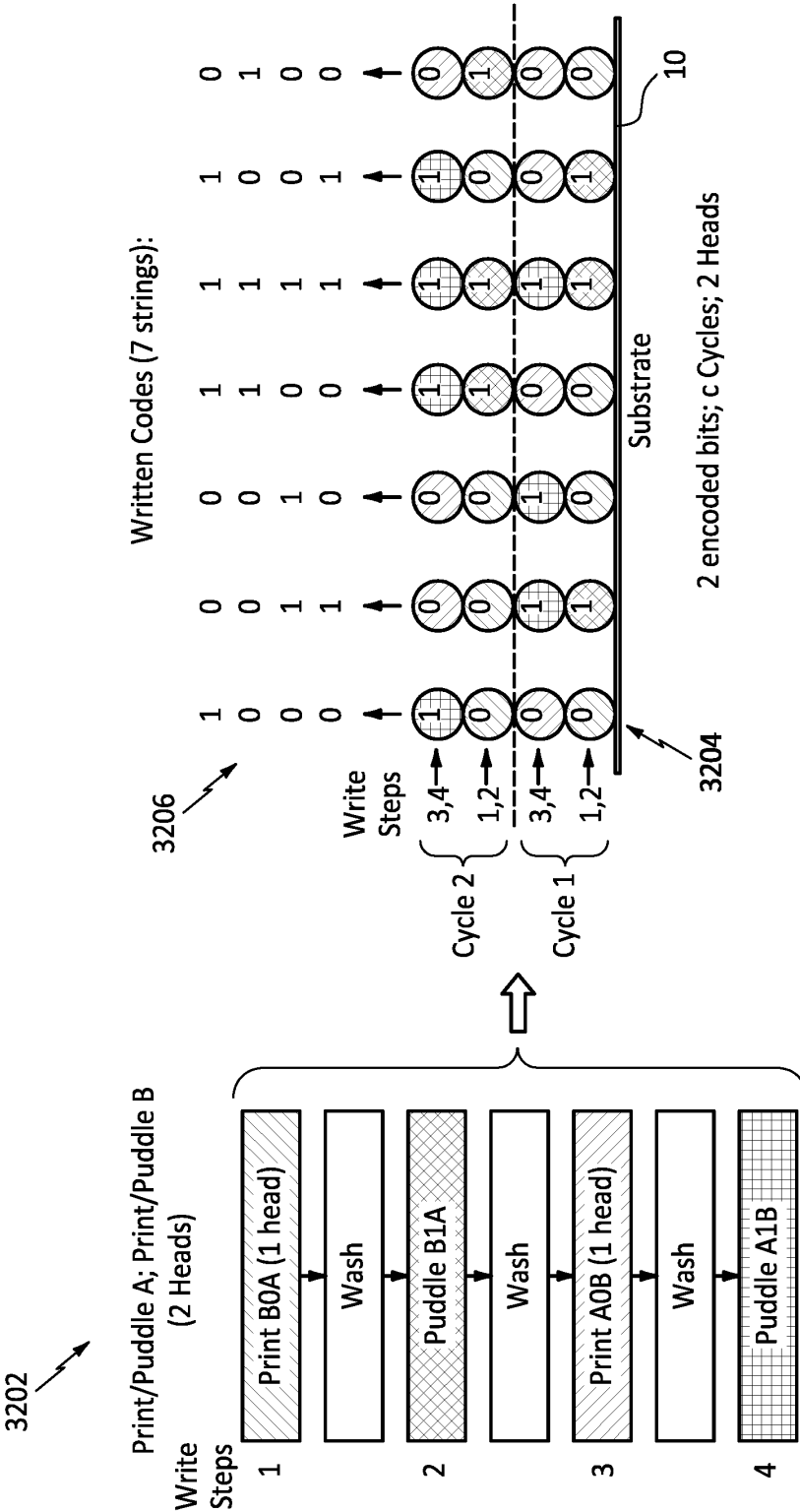


FIG. 32