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(54) Title: EMBEDDED CATALYST FOR ATOMIC LAYER DEPOSITION OF SILICON OXIDE

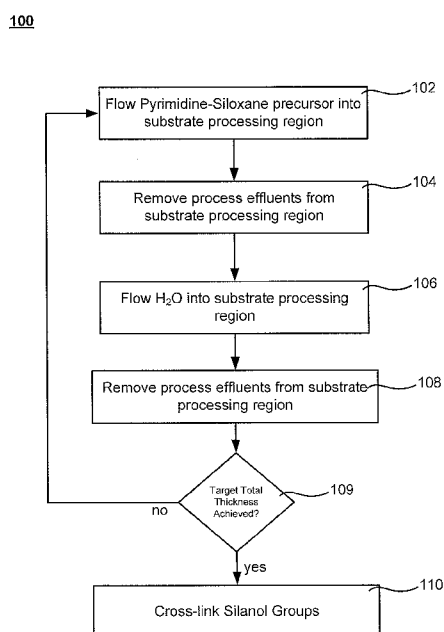


FIG 1

(57) Abstract: Catalyzed atomic layer deposition from a reduced number of precursors is described. A deposition precursor contains silicon, oxygen and a catalytic ligand. A hydroxyl-terminated substrate is exposed to the deposition precursor to form a silicon bridge bond between two surface-bound oxygens. The surface-bound oxygens were part of two surface-bound hydroxyl groups and the adsorption of the deposition precursor liberates the hydrogens. The silicon atom is also chemically-bound to one or two additional oxygen atoms which were already chemically-bound to the silicon within a same deposition precursor molecule. At least one of the additional oxygen atoms is further chemically-bound to the catalytic ligand either directly or by way of a hydrocarbon chain. Further exposure of the substrate to moisture (H₂O) results in displacement of the additional oxygen which are replaced by hydroxyl groups from the moisture. The surface is again hydroxyl-terminated and the process may be repeated. The catalytic nature of the reaction enables the deposition to occur at low substrate temperatures. The chemically-embedded nature of the catalyst increases the deposition per cycle thereby reducing the number of precursor exposures to grow a film of the same thickness.



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