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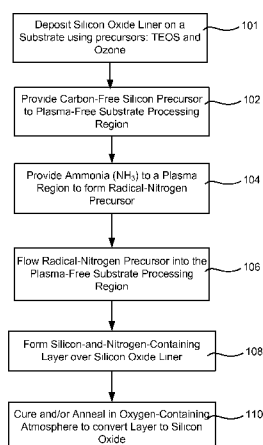


FIG 1

(57) Abstract: Methods of forming silicon oxide layers are described. The methods include mixing a carbon-free silicon-containing precursor with a radical-nitrogen precursor, and depositing a silicon-and-nitrogen-containing layer on a substrate. The radical-nitrogen precursor is formed in a plasma by flowing a hydrogen-and-nitrogen-containing precursor into the plasma. Prior to depositing the silicon-and-nitrogen-containing layer, a silicon oxide liner layer is formed to improve adhesion, smoothness and flowability of the silicon-and-nitrogen-containing layer. The silicon-and-nitrogen-containing layer may be converted to a silicon-and-oxygen-containing layer by curing and annealing the film. Methods also include forming a silicon oxide liner layer before applying a spin-on silicon-containing material.