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(54) Title: HYBRID ATOMIC LAYER DEPOSITION

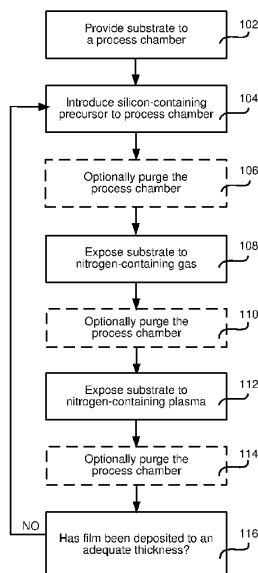


FIG. 1A

(57) Abstract: Methods and apparatuses for depositing silicon nitride using a hybrid atomic layer deposition technique are provided. Methods and apparatuses for forming halogen-free undercoats in a process chamber using a halogen-free aminosilane precursor are provided. Methods and apparatuses for forming silicon oxynitride using a single-wafer chamber are provided herein. Methods and apparatus also include forming graded silicon oxynitride using cyclic deposition and in-situ nitridation and/or oxidation techniques.

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