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(54) Title: CONFORMAL LAYERS BY RADICAL-COMPONENT CVD

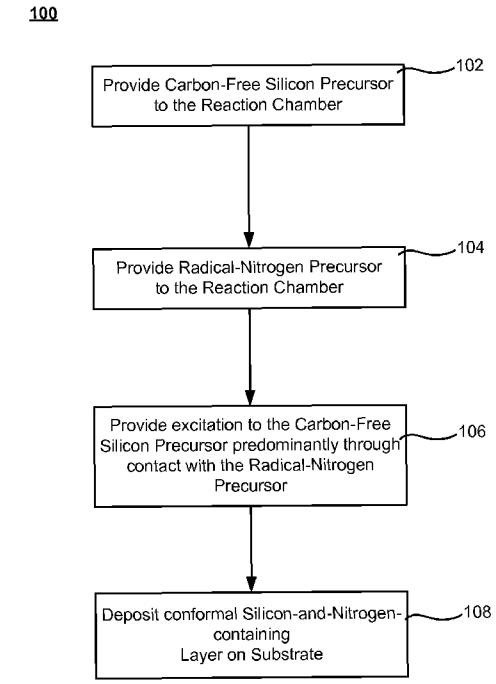


FIG 1

(57) Abstract: Methods, materials, and systems are described for forming conformal dielectric layers containing silicon and nitrogen (e.g., silicon-nitrogen-hydrogen (Si-N-H) film) from a carbon-free silicon-and-nitrogen precursor and radical-nitrogen precursor. Carbon-free silicon-and-nitrogen precursor is predominantly excited by contact with radical-nitrogen precursor. Because silicon-and-nitrogen film is formed without carbon, conversion of film into hardened silicon oxide is done with less pore formation and less volume shrinkage. The deposited silicon-and-nitrogen-containing film may be wholly or partially converted to silicon oxide which allows optical properties of conformal dielectric layer to be selectable. The deposition of a thin silicon-and-nitrogen-containing film may be performed at low temperature to form a liner layer in a substrate trench. The low temperature liner layer is found to improve wetting properties and allows flowable films to more completely fill the trench.

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