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PRISING SILICON AND OXYGEN

(57) Abstract: A halidosilyl-substituted cyclic silicon precursor compound has at least 2 to 1 of carbon to silicon ratio and is defined by Formula I herein. A method for forming a film comprising silicon and oxygen and having a carbon content ranging from 10 at. % to 50 at. % via a thermal ALD process includes placing one or more substrates comprising a surface feature into a reactor; heating to reactor to one or more temperatures ranging from ambient temperature to about 600°C and optionally maintaining the reactor at a pressure of 100 torr or less; introducing into the reactor at least one silicon precursor according to Formula I; purging with an inert gas; providing a nitrogen source into the reactor to react with the surface to form a carbon doped silicon nitride film, purging with inert gas to remove reaction by-products, repeating steps to provide a desired thickness of the carbon doped silicon nitride film, treating the resulting carbon doped silicon nitride film with an oxygen source at one or more temperatures ranging from about ambient temperature to 1000 °C or from about 100 °C to 400 °C to convert the carbon doped silicon nitride film into a carbon doped silicon oxide film; and exposing the carbon doped silicon oxide film to a plasma comprising hydrogen.

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