ABSTRACT OF THE DISCLOSURE

Native oxides can be removed from a substrate having high aspect ratio openings therein by using a plasma gas precursor mixture of a reactive halogen-containing gas and a carrier gas such as helium. The lightweight ions generated in the plasma react with oxygen to produce very volatile oxygen-containing species that can be readily removed through the exhaust system of the plasma chamber, preventing re-deposition of oxides on the surface of the substrate or on the sidewalls or bottom of the openings. When the substrate is mounted in a plasma chamber having dual power sources that can form a plasma above the substrate and can apply bias to the substrate, tapered openings are formed rapidly that can be readily filled without forming voids.