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(54) **HIGH TEMPERATURE INTERFACE LAYER GROWTH FOR HIGH-K GATE DIELECTRIC**

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(57) **ABSTRACT**

The present invention pertains to methods for forming high quality thin interface oxide layers suitable for use with high-k gate dielectrics in the manufacture of semiconductor devices. An ambient that contains oxygen and a reducing agent is utilized to grow the layers. The oxygen facilitates growth of the layers, while the reducing agent simultaneously counteracts that growth. The rate of growth of the layers can thus be controlled by regulating the partial pressure of the reducing agent, which is the fraction of the reducing agent in the gas phase times the total pressure. Controlling and slowing the growth rate of the layers facilitates production of the layers to thicknesses of about 10 Angstroms or less at temperatures of about 850 degrees Celsius or more. Growing the layers at high temperatures facilitates better bonding and production of higher quality layers, which in turn yields better performing and more reliable resulting products.

**28 Claims, 6 Drawing Sheets**

