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(54) **HIGH DIELECTRIC CONSTANT METAL SILICATES FORMED BY CONTROLLED METAL-SURFACE REACTIONS**

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(57) **ABSTRACT**

A method of forming an insulation layer on a semiconductor substrate includes modifying a surface of a semiconductor substrate with a metal or a metal-containing compound and oxygen to form an insulation layer on the surface of the semiconductor substrate, wherein the insulation layer comprises the metal or metal-containing compound, oxygen, and silicon such that the dielectric constant of the insulation layer is greater relative to an insulation layer formed of silicon dioxide, and wherein the insulation layer comprises metal-oxygen-silicon bonds.

40 Claims, 6 Drawing Sheets