ABSTRACT

A METHOD TO FORM NON-VOLATILE MEMORY CELLS

A new method of forming non-volatile memory cells with an improved bottom silicon dioxide layer of the O-N-O has been achieved. A semiconductor substrate is provided. A tunneling dielectric layer is grown overlying the semiconductor substrate. A polysilicon layer is deposited overlying the tunneling dielectric layer. Nitrogen is implanted into the polysilicon layer to form a nitridized surface region. The polysilicon layer and the tunneling dielectric layer are then patterned to form floating gates. A bottom silicon dioxide layer is grown overlying the floating gates by thermal oxidation of the polysilicon layer. The nitridized surface region reduces the rate of thermal oxidation and creates a smooth surface. A silicon nitride layer is deposited overlying the bottom silicon dioxide layer. A top silicon dioxide layer is formed overlying the silicon nitride layer to complete the O-N-O stack. A conductive layer, that may comprise polysilicon, is deposited overlying the top silicon dioxide layer. The conductive layer, the top silicon dioxide layer, the silicon nitride layer, and the bottom silicon dioxide layer are patterned to form control gates and to complete the non-volatile memory cells.

FIG 9