

**METHOD FOR FORMING RESIDUE FREE PATTERNED POLYSILICON
LAYERS UPON HIGH STEP HEIGHT INTEGRATED CIRCUIT SUBSTRATES**

ABSTRACT OF THE DISCLOSURE

A method for forming a residue free patterned polysilicon layer upon a high step height patterned substrate layer. First, there is provided a semiconductor substrate having formed thereon a high step height patterned substrate layer. Formed upon the high step height patterned substrate layer is a polysilicon layer, and formed upon the polysilicon layer is a patterned photoresist layer. The patterned photoresist layer exposes portions of the polysilicon layer at a lower step level of the high step height patterned substrate layer. The polysilicon layer is then patterned through the patterned photoresist layer as an etch mask employing an anisotropic first etch process to yield a patterned polysilicon layer upon the surface of the high step height patterned substrate layer and polysilicon residues at the lower step level of the high step height patterned substrate layer. The anisotropic first etch process is a Reactive Ion Etch (RIE) anisotropic first etch process which simultaneously passivates the exposed sidewall edges of the patterned polysilicon layer. Finally, the polysilicon residues formed at the lower step level of the high step height patterned substrate layer are removed through an isotropic second etch process. The isotropic second etch process is a Reactive Ion Etch (RIE) isotropic second etch process which employs hydrogen bromide (HBr) and sulfur hexafluoride (SF₆) as the reactant gases.

(FIGURE 4 IS SUGGESTED FOR PUBLICATION)