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SHALLOW TRENCH ISOLATION USING TEOS CAP AND POLYSILICON PULLBACK

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Abstract of the Invention

A method and apparatus for shallow trench isolation. First, a layer of silicon nitride (SiN) is deposited over a semiconductor substrate. A layer of polysilicon is then deposited over the silicon nitride layer. A layer of tetraethylorthosilicate (TEOS) is deposited over the polysilicon layer. Mask and etch steps are performed to form an opening that extends through the TEOS layer and through the polysilicon layer. An etch step is then performed to etch the exposed side surfaces of the polysilicon layer. Thereby, the exposed side surfaces of the polysilicon layer are moved laterally. An etch step is then performed so as to form a trench that extends into the semiconductor substrate. Dielectric material is deposited such that the dielectric material fills the trench and fills the opening that extends through the polysilicon layer and the silicon nitride layer. The substrate is then polished using a chemical mechanical polishing process. The chemical mechanical polishing process removes the polysilicon layer and forms a plug of dielectric material that fills the trench. The plug of dielectric material has a top surface that is planar with respect to the top of the silicon nitride layer.

FIGURE 2