Abstract

NARROW DEEP TRENCH ISOLATION PROCESS WITH TRENCH FILLING BY OXIDATION

The invention is a process for filling narrow isolation trenches with thermal oxide using a nitride spacer and a second trench etch. The method begins by providing forming a pad oxide layer 20 and a first nitride layer 30 over a substrate. A first opening is formed in the pad oxide layer 20 and first nitride layer 30. The substrate is then etched through the first opening forming a first trench 40 in the substrate. A thin oxide film 50 is then grown over the substrate in the bottom and sidewalls of the first trench 40. Nitride spacers 60 are grown over the sidewalls of the first trench and over the thin oxide layer 40 on the sidewalls of the trench. A portion of the thin oxide film 50 on the bottom of the trench is etched. The substrate in the bottom of the first trench is etched forming a second trench 70. The etch exposes portions of the substrate on the bottom of the deeper second trench. The bottom and sidewalls of the second trench is oxidized forming a isolation oxide layer 80C thereby filling the second trench. The oxide pushes the spacers 60 up till the spacers close off the trench 70 thereby slowing the oxidation rate. The slow oxidation rate reduces stress by the oxide on the trench walls by allowing the viscous oxide to flow.

(FIGURE 1 IS SUGGESTED FOR PUBLICATION)