ABSTRACT

DISLOCATION FREE LOCAL OXIDATION OF SILICON WITH SUPPRESSION OF NARROW SPACE FIELD OXIDE THINNING EFFECT

A novel design of an oxidation mask for improved control of birds beak and more specifically for tailoring and smoothing the field oxide isolation profile in the vicinity of the birds beak. The mask design is particularly advantageous for narrow field isolation spacings found in sub half-micron integrated circuit technology. The mask uses a thin silicon nitride foot along its lower edge to allow nominal expansion of the oxide during the early stages of oxidation, thereby permitting in-situ stress relief as well as a smoothing of the oxide profile. A cantilevered portion of a second, thicker silicon nitride layer suppresses the upward movement of the flexible foot during the later stages of the oxidation when the growth rate has slowed, thereby inhibiting the growth of the birds beak. Shear stresses responsible for dislocation generation are reduced as much as fifty fold. This stress reduction is accompanied by an improvement in surface topography as well as suppression of the narrow oxide thinning effect.

(FIGURE 4 IS SUGGESTED FOR PUBLICATION)