ABSTRACT

A METHOD TO FORM AN INVERTED STAIRCASE STI STRUCTURE BY ETCH-DEPOSITION-ETCH AND SELECTIVE EPITAXIAL GROWTH

A method of forming an inverted staircase shaped STI structure comprising the following steps. A semiconductor substrate having an overlying oxide layer is provided. The substrate having at least a pair of active areas defining an STI region therebetween. The oxide layer is etched a first time within the active areas to form first step trenches. The first step trenches having exposed sidewalls. Continuous side wall spacers are formed on said exposed first step trench sidewalls. The oxide layer is etched X + 1 more successive times using the previously formed step side wall spacers as masks to form successive step trenches within the active areas. Each of the successive step trenches having exposed sidewalls and have side wall spacers successively formed on the successive step trench exposed sidewalls. The oxide layer is etched a final time using the previously formed step side wall spacers as masks to form final step trenches exposing the substrate within the active areas. The STI region comprising an inverted staircase shaped STI structure. The step side wall spacers are removed from the X + 2 step trenches. A planarized active area silicon structure is formed within the X + 2 and final step trenches.

Figure 10



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