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## ABSTRACT

METHOD FOR BUFFER STI SCHEME WITH A HARD MASK LAYER AS AN OXIDATION BARRIER

A method of manufacturing a shallow trench isolation using a polishing step with reduced dishing. A pad layer, a polish stop layer, a buffer layer and a hard mask layer are formed over a substrate. The hard mask layer has a hard mask opening. We etch a trench opening in the buffer layer, the polish stop layer, the pad layer and form a trench in the substrate using the hard mask layer as an etch mask. We form an oxide trench liner layer along the sidewalls of the trench and an oxide buffer liner layer on the sidewalls of the buffer layer using a thermal oxidation. The hard mask layer prevents the oxidation of the top surface of the buffer layer during the oxidation of the oxide trench liner. This prevents the buffer layer from being consumed by the oxidation and leaves the buffer layer to act in the subsequent chemical-mechanical polish (CMP) step. Next, an insulating layer is formed at least partially filling the trench. The insulating layer is chemical-mechanical polished using the polish stop layer as a stop layer. The buffer layer acts to prevent field oxide dishing during the chemical-mechanical polish.

FIGURE 1