ABSTRACT

A NOVEL TECHNIQUE TO ACHIEVE THICK SILICIDE FILM FOR ULTRA-SHALLOW JUNCTIONS

A method for forming a thicker silicide over a MOS device is described. This is achieved using a process where the gate structure is formed by conventional techniques upon a substrate. A low-energy implantation is performed to form lightly doped source and drain (LDD) regions in the substrate in the areas not protected by the gate structure. A first spacer composed of tetraethyl-oxysilane (TEOS oxide), for example, is formed along the sidewalls of the gate structure. A second low-energy implantation is performed to form the source and drain (S/D) in the areas not protected by the gate structure and first spacer. A layer of metal such as titanium (Ti), for example, is then deposited over the surface of the gate structure. A second sidewall spacer composed of titanium nitride (TiN), for example, is formed along the sidewalls of the gate structure covering the metal over the first sidewall spacer and covering the metal over isolation regions. A layer of polysilicon is then deposited over the surface of the gate structure. A rapid thermal annealing (RTA) is performed causing the metal to react with both the silicon in the junction below the metal and the polysilicon above the metal forming a metal silicide. Metal along the sidewalls between the first and second sidewall spacers and over the isolation regions does not react and thereafter, the unreacted polysilicon is etched away. This is followed by removal of the second spacer and the unreacted metal. By providing an additional source of silicon in the polysilicon layer above the metal, a thicker silicide is achieved.

FIGURE 11