

Research on High Dielectric HfO₂ Stack Structure Applied to Field Effect Transistors

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Abstract : This study focuses on the Al/HfO₂/Si/Al structure to explore the electrical properties of the structure. This experiment uses a radio frequency magnetron sputtering system to deposit high dielectric materials on p-type silicon substrates of 1~10 Ω-cm (100). Consider the hafnium dioxide film as a dielectric layer. Post-deposition annealing at 750°C in nitrogen atmosphere. Electron beam evaporation of metallic aluminum is then used to complete the top/bottom electrodes. The metal is post-annealed at 450°C for 20 minutes in a nitrogen environment to complete the MOS component. Its dielectric constant, equivalent oxide layer thickness, oxide layer defects, and leakage current mechanism are discussed. At PDA 750°C-5s, the maximum k value was found to be 21.2, and the EOT was 3.68nm.

Keywords : high-k gate dielectrics, HfO₂, post deposition annealing, RF magnetic

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