

低溫微波退火應用於高介電薄膜/金屬閘極元件之研究(Study of High-k Metal-Gate  
by Low Temperature Microwave Annealing)

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摘要

To improve the performance of complementary metal-oxide-semiconductor (CMOS) devices, it is necessary to use a pair of metals with work functions that are near the conduction-band and valence-band edges of silicon to replace conventional n+/p+ poly-Si gate materials. Gate-last process has been adopted to eliminate work function shift, which occurs from the band-edge to the mid-gap and high-k dielectric degradation after high temperature thermal process for dopant activation in source/drain (S/D) regions. However, these complex processes lead to restrictions on circuit design and process window. If gate-first process efficiently suppresses work function shift of metal gate electrodes and decreases equivalent oxide thickness (EOT) of gate dielectrics after dopant activation process, it will become a promising candidate to simplify and reduce cost of nowadays CMOS fabrication process.

關鍵字：Metal gate、TiN、TaN、Microwave Annealing、Work Function