

Remote Plasma-Enhanced Atomic Layer Deposition (RPEALD) Nitride/Oxide Gate Dielectric for Sub-65nm Low Standby Power CMOS Application

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Abstract

A novel remote plasma-enhanced atomic layer deposition (RPEALD) silicon nitride technology is developed in a production-worthy tool for nitride/oxide (N/O) stack gate dielectric. Ultrathin N/O stack (EOT~13Å) is realized with 50X gate leakage current reduction over thermal oxides. In addition to drastic gate current reduction, devices with RPEALD N/O stack and plasma-nitrided base oxide also exhibit well-behaved device performance and superior reliability characteristics (Qbd, TDDB, NBTI), very promising for sub-65nm low power CMOS applications.