

Ge-Redistributed Poly-Si/SiGe Stack Gate (GRPSG) for High-Performance CMOSFETs

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A Ge-redistributed poly-Si/SiGe stack gate (GRPSG) has been proposed to improve the current performance of PMOS without the degradation of NMOS for sub-0.1 μ m CMOSFETs with ultrathin gate oxide. Ge diffusion into poly-Si layer was promoted more by ion implantation of N-type dopants such as P and As rather than P-type dopants. NMOS and PMOS had different Ge concentration at the interface between gate electrode and gate oxide by an additional annealing to redistribute Ge profile. The current performance of NMOS with GRPSG with low Ge content (<5%) was not degraded, while that of PMOS with GRPSG with high Ge content (>20%) was improved due to the suppression of poly-depletion effect and boron penetration. In addition, the gate reoxidation was modified to reduce Gm degradation by reduced gate bird's beak. High-performance 70nm-CMOSFETs were successfully fabricated using the simple GRPSG process.