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GE as a Channel Material in P-Type MOSFETs

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Abstract : Novel materials and innovative device structures has become necessary for the future of CMOS. High mobility materials like Ge is a very promising material due to its high mobility and is being considered to replace Si in the channel to achieve higher drive currents and switching speeds .Various approaches to circumvent the scaling limits to benchmark the performance of nanoscale MOSFETS with different channel materials, the optimized structure is simulated within nextnano in order to highlight the quantum effects on DG MOSFETs when Si is replaced by Ge and SiO2 is replaced by ZrO2 and HfO2as the gate dielectric. The results have shown that Ge MOSFET have the highest mobility and high permittivity oxides serve to maintain high drive current. The simulations show significant improvements compared with DGMOSFET using SiO2 gate dielectric and Si channel.

Keywords : high mobility, high-k, quantum effects, SOI-DGMOSFET
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