Germanium MOS: An Evaluation from Carrier Quantization and Tunneling Current

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Abstract

An evaluation of Ge MOS from quantization and gate tunneling current simulations is reported . Electron quantization effect is stronger and thus more important in Ge than in Si, and results in smaller inversion capacitance in NMOS and considerably larger gate tunneling current . High-k gate dielectrics are required for low leakage; however, significant challenges exist in the formation of high quality interface layer between high-K and Ge. Using constant inversion charge for supply voltage V_{DD} scaling, moderate reduction in inversion charge and enhancement in mobility is required to meet ITRS roadmap.