

## SCS-P-04

# Comparison of different surface orientation in narrow fin MuGFETs

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Carrier mobility in SOI MOSFETs can be improved by optimizing the orientation of the crystal surface. In multiple-gate SOI MOSFETs (MuGFETs), such as FinFETs or Tri-gate FETs, the surface orientation can be changed by modifying the layout of the devices (see figure 1). Device performance characteristics are investigated for different surface orientation and doping concentration on accumulation-mode p-type- and inversion-mode n-type MuGFETs. Short-channel effects and drain breakdown voltage are better if carrier transport is in the  $\langle 100 \rangle$ -direction than in the  $\langle 110 \rangle$ -direction. This is due to the larger Si/SiO<sub>2</sub> interface roughness and the higher density of interface state at (110) surfaces, and to the difference of effective mass. The mobility in PMOS devices, however, is much higher in the  $\langle 110 \rangle$ -direction than that in the  $\langle 100 \rangle$ -direction. For better performance of device, our results show that optimized fin orientation can improve device stability and performance.

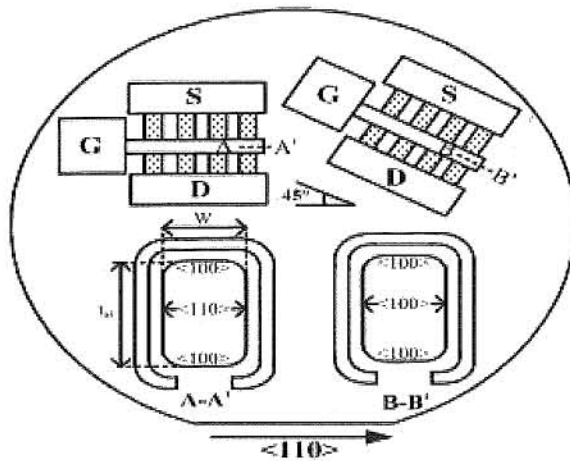


Figure 1. Fin layouts with different orientation of MuGFETs.

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