Quantum simulations of nanoscale dual-gate FETs

Objective:

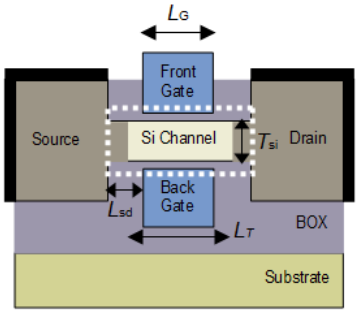
- Simulations of size-quantization effects in a novel dual-gate 2-D FET structure.

Approach:

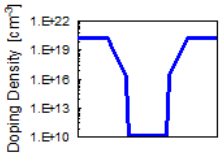
- Three software packages namely nanoFET, nanoMOS and QuaMC 2D that are freely available on nanoHUB.org were employed.
- A double-gate SOI MOSFET with 9 nm gate length, an ultra-thin (3 nm) and intrinsic channel, and heavily doped electrodes was used as a model device.

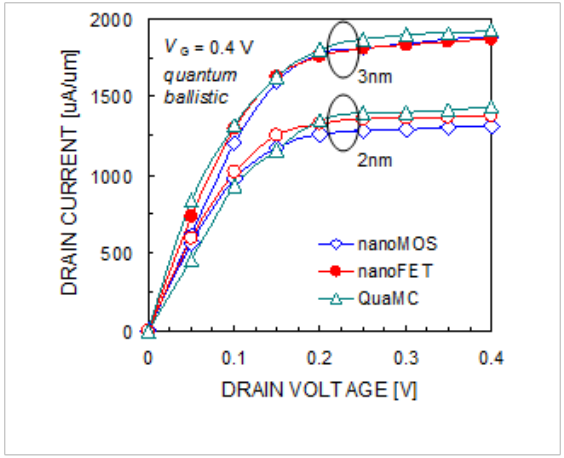
Impact:

- nanoHUB aims at the development of new community codes that provide the nanoscience research community with new capabilities and lay a foundation for a new generation of CAD tools that will pave the way to ground breaking nanotechnology devices.



T_{ox} = 1 nm
T_{si} = 3 nm
L_G = 9 nm
L_T = 17 nm
L_{sd} = 10 nm
N_{sd} = 2 x 10^{20} cm^{-3}
N_b = 0
g = 1 decade/nm
Φ_G = 4.188
V_G = 0.4 V





Result:

- The impact of quantum mechanical effects on the device properties was elucidated and key design issues were suggested.
- Availability of free and community software tools will accelerate the discovery of new and improved devices.

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