Drift Diffusion Simulator Tool Development for MultiGate Field Effect Transistors (MuGFET)

Objective:

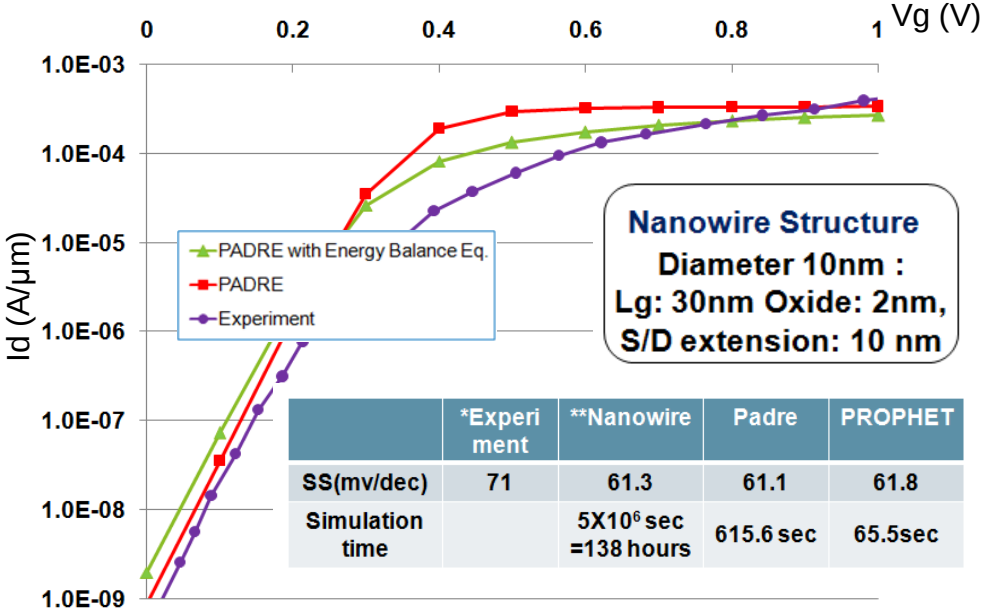
- Rappture tool development - drift diffusion simulator for relatively large-sized multigate FET.
- Understand drift diffusion transport and its application/limitation

Approach:

- Utilize available drift diffusion simulator (PROPHET and PADRE)
- User-friendly input interface implementation via Rappture
- Energy balance equation for velocity overshoot in small device

Impact:

- Powerful tool for semiconductor engineers: useful analysis options
- Significantly reduced simulation time compared to quantum transport simulator



	*Experiment	**Nanowire	Padre	PROPHET
SS(mv/dec)	71	61.3	61.1	61.8
Simulation time		$5X10^6$ sec =138 hours	615.6 sec	65.5sec

Result:

- Quantative agreement of simulation result with experiment
- Significant effects of the velocity overshoot on the on-current , subthreshold slope and transconductance.
- Effects of Gaussian doping profile on on-current and DIBL/SS : trade-off (characteristic length ↑ : Ion↑ DIBL↓ SS ↑)

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