

## Current-Voltage Characteristics of Ballistic Nanowire FETs by Numerical Simulation

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**Introduction:** Ballistic transport is transport of electrons in a medium without scattering and it will be happen when the length of device channel less than the mean free path of the electron. Transistor's dimensions had been scaled into the nanometer region in advanced MOSFET technology and it is expected that novel device will be operated near ballistic scale in near future. Ballistic nanowire transistor has begun to obtained broad attention due to its unique advantages such as the excellent controllability of device current. Understanding of device physics and the over all properties of ballistic nanowire transistor regarded as an important subject in ballistic nanowire transistor research. Here we studied current-voltage characteristics of ballistic nanowire FETs based on numerical simulation.

**Approach:** Current-voltage characteristics of ballistic nanowire FETs were calculated using Notori model. Subband structures were calculated by Tokyo Ab-initio Program Package.

**Result:** The calculated model of nanowire FETs was gate all around n type silicon nanowire [100] structure. Fig.1 shows the calculated current-drain voltage characteristics of n type silicon nanowire FET with subband structure at a room temperature of 300K and at a low temperature of 3K. These results are consistent with the results calculated by Natori *et al.*. More results will be presented at the conference.

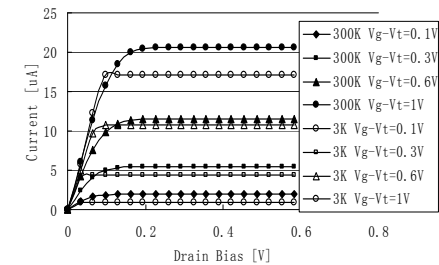


Fig.1 I-V<sub>D</sub> characteristics of the Si ballistic nanowire FETs