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Supporting Information

Can ultra-thin Si FinFETs work well at the sub-10 nm gate-length region?

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The source and drain electrodes are symmetrically doped. In order to realize the most efficient carrier injection, the device's doping concentration needs to be optimized. The tested doping concentrations range from 1×10^{19} to 5×10^{19} cm^{-3} (close to the experimental doping level). By comparing the transfer characteristics of the 5 nm gate-length ultra-thin Si TG FinFETs at bias voltage (V_{bias}) of 0.64 V (see Fig. S1(a)), we finally picked the doping concentration of 3×10^{19} cm^{-3} since the maximum I_{on} and the minimum subthreshold swing (SS) are both observed at this doping level. Besides, for the same ultra-thin Si TG FinFET, the *n*-type device outperforms its *p*-type counterpart, showing a ~16% increase in the on-state current (see Fig. S1(b)). The better performance in the *n*-type device can be attributed to the higher mobility of electrons than holes, originating from the smaller effective mass m^* of electrons (0.12 m_0) than that of holes (0.15 m_0).

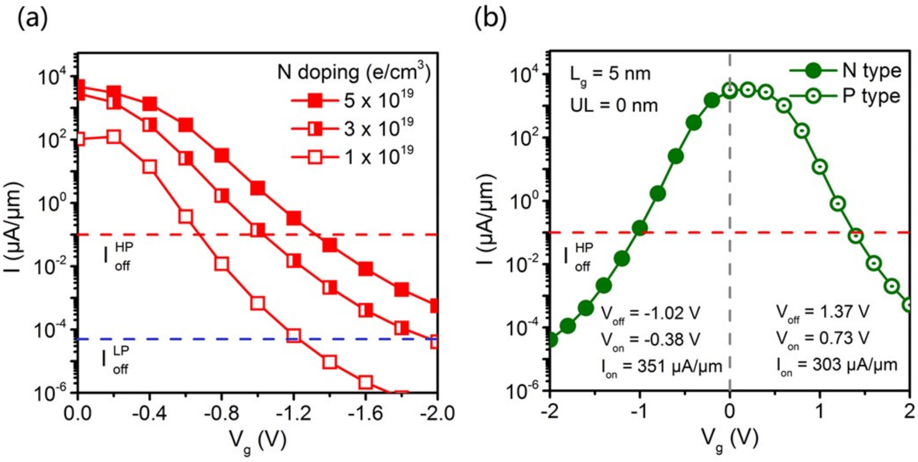

Figure S1. (a) Transfer characteristics of the ultra-thin Si tri-gate FinFETs for different source and drain doping concentration of electron (N_{e}) at V_{bias} of 0.64 V. (b) Transfer characteristics for the *n*- and *p*-type Si tri-gate FinFETs at L_{g} = 5 nm (UL = 0 nm) under V_{bias} of 0.64 V and doping concentration of 3×10^{19} e/cm^3.