Assignment #6 Wonbin Ju 20182018

An electrostatic potential in eq. 1 is numerically calculated by using the Newton's method.

$$\frac{d}{dx}\left[\epsilon(x)\frac{d}{dx}\phi(x)\right] = -N_{acc} + n_i e^{q\phi/k_B T} \qquad \text{eq. 1}$$

n_{int} is the intrinsic carrier density of Si, N^+ is the dopant density, ϕ is the electrostatic potential, k_B is the Boltzmann constant, q is the electron charge, and T is the temperature. n_{int} of Si at 300 K is 10^{10} cm^{-3}. N^+ is 10^{18} cm^{-3}.

A numerically calculated integrated electron density is shown in figure 1 in semilog plots. The integrated electron density decreases as the gate voltage increase.

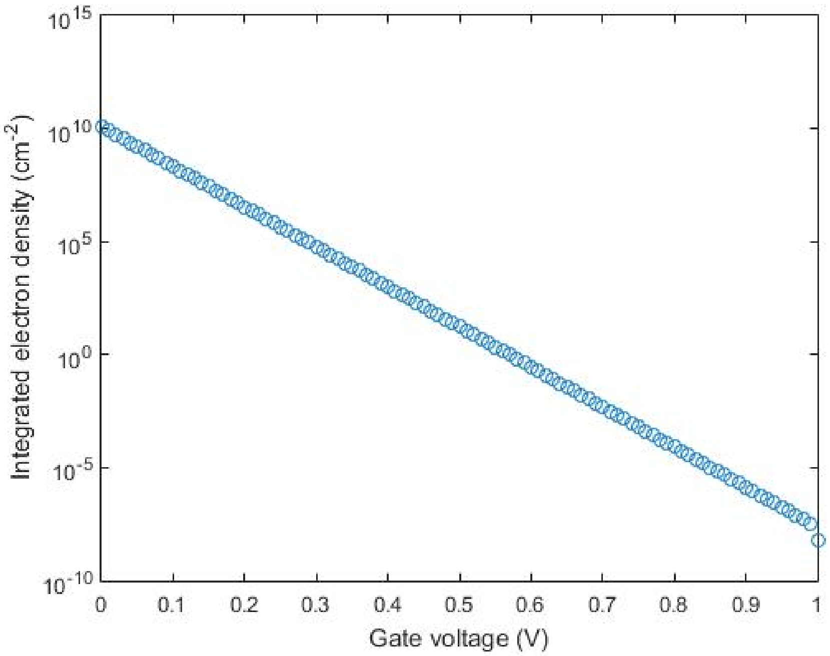

Figure 1. The integrated electron density as a function of the gate voltage.