Homework #6

20152052
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1. **Calculate the integrated electron density as a function of the gate voltage using self-consistent solution**.

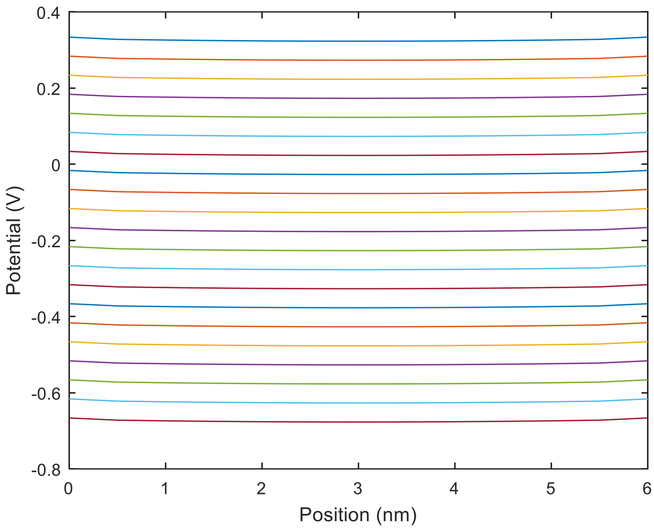

Figure 1. Potential as a function of position with different gate voltage

As applied voltage increases, potential decreases. Because it is harder for electrons to excite according to the Boltzmann distribution. It is similar to the result in HW #4.

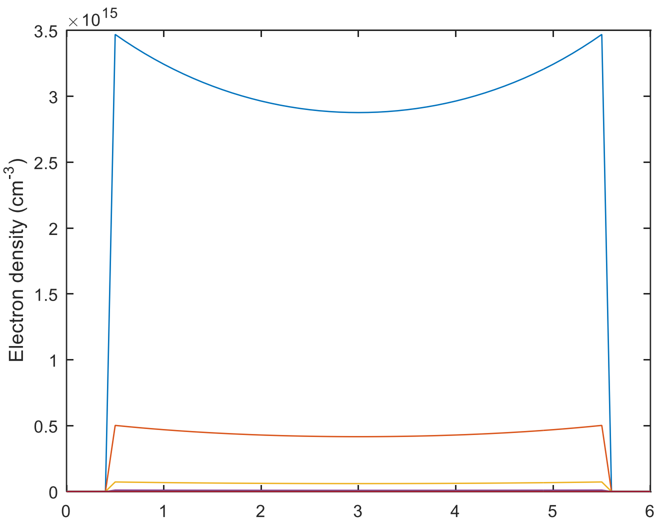

Figure 2. Electron density as a function of position with different gate voltage

As applied voltage increases, electron density decreases.

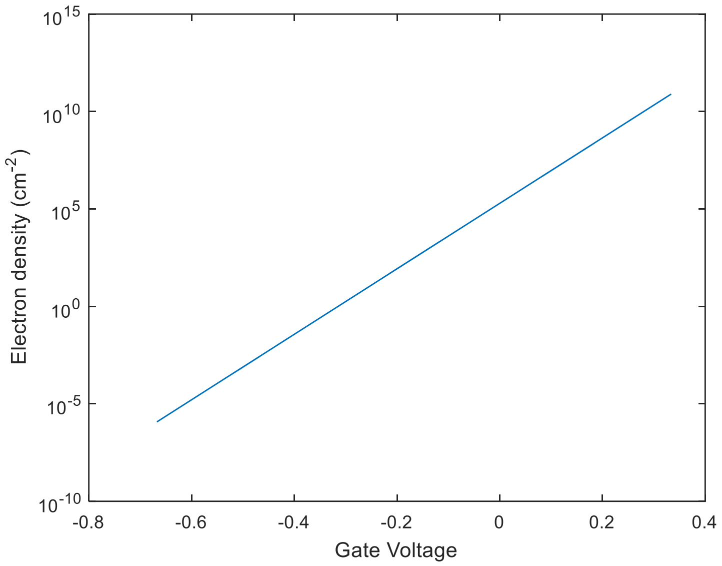

Figure 3. Integrated electron density as a function of gate voltage

According to figure 3, integrated electron density increases as gate voltage increases (decrease in applied voltage)

2. **Compare self-consistent solution with a result in HW#4 that does not involve variation of charge density due to potential itself**.

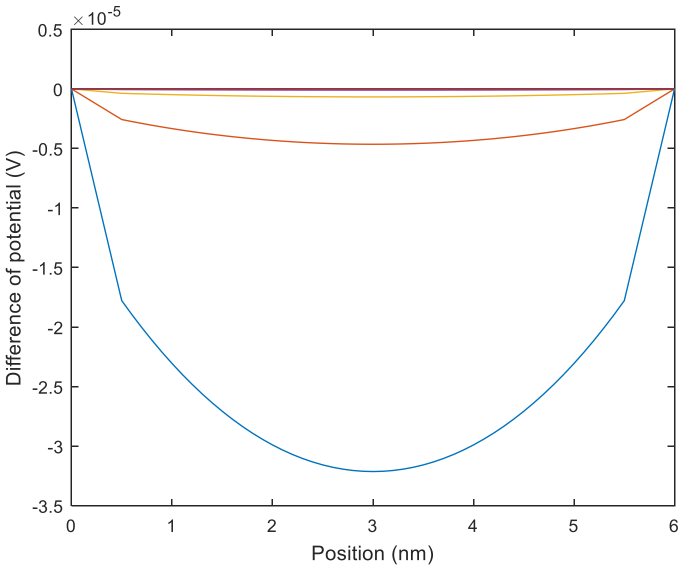

Figure 4. Correction of the potential as a function of position with different gate voltage

Figure 4 shows the correction of the potential by comparing the self-consistent solution with the solution obtained by just calculating Poisson's equation (HW#4).

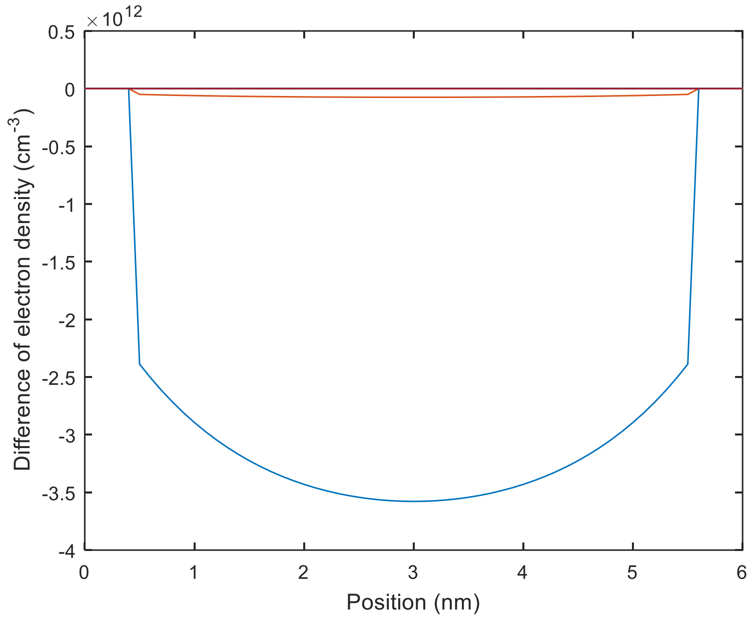

Figure 5. Correction of carrier density as a function of position with different gate voltage

The carrier density is also modified by correction of potential above.