Home work #7

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Results of the simulation for the MOS with the Schrodinger Poisson solver

Environments

Dopping: $N^- = 10^{15}[\mathrm{cm}^{-3}]$, Thickness: 1μm, Temperature: 300K

Parameter setup

Discritization: $N = 1001$, The # of eigen energies for the K-points integration: nev = 100

Case 1.

Boundary conditions:
$q\phi(x=0) = -0.1[\text{ev}]$, $q\phi(x=1\mu\text{m}) = -0.28715[\text{ev}]$

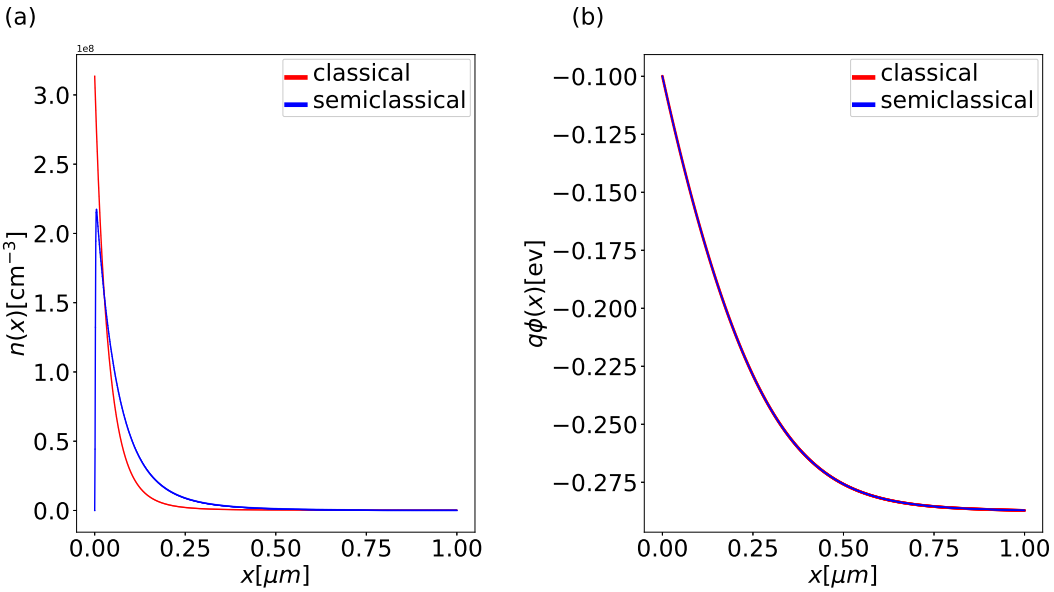

Figure 1: The plot for an electron density $n(x)$ and a scalar function $\phi(x)$.
(a): results for an electron density with classical(red) and semi classical(blue) approaches.
(b): results for a scalar potential with classical(red) and semi classical(blue) approaches.

Case 2.

Boundary conditions:
$q\phi(x = 0) = 0.1[\text{ev}]$, $q\phi(x = 1\mu\text{m}) = -0.28715[\text{ev}]$

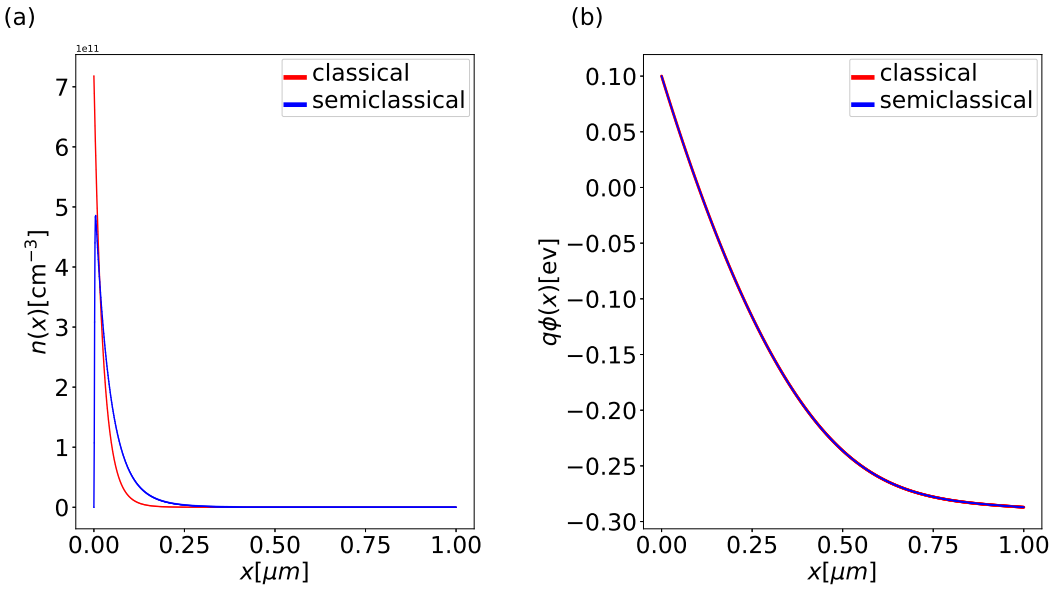

Figure 2: The plot for an electron density $n(x)$ and a scalar function $\phi(x)$.
(a): results for an electron density with classical(red) and semi classical(blue) approaches.
(b): results for a scalar potential with classical(red) and semi classical(blue) approaches.

Case 3.

Boundary conditions:
$q\phi(x = 0) = 0.3$[ev], $q\phi(x = 1\mu\text{m}) = -0.28715$[ev]

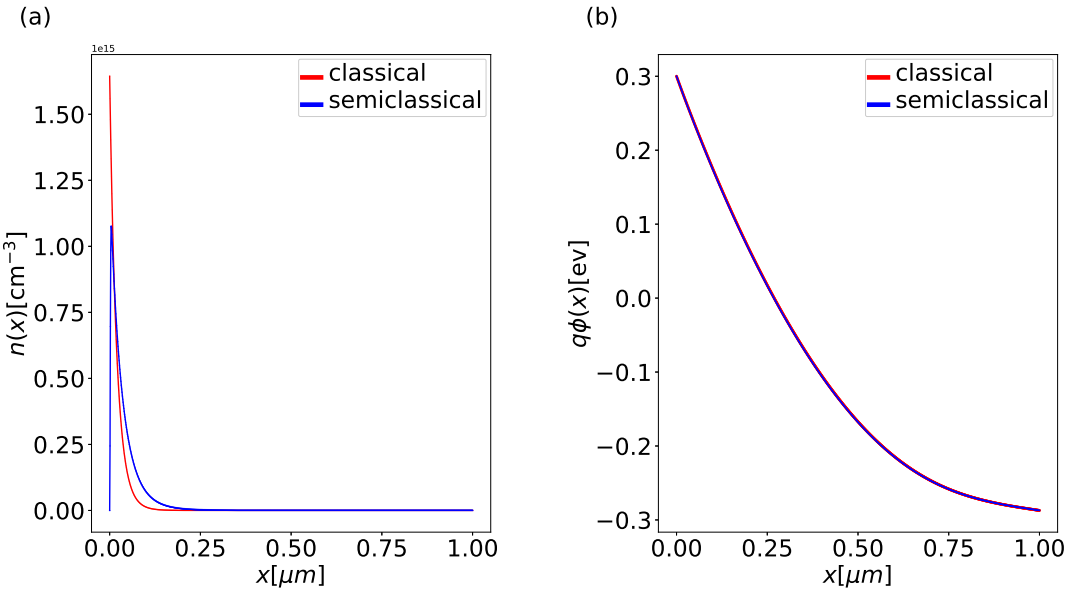

Figure 3: The plot for an electron density $n(x)$ and a scalar function $\phi(x)$.
(a): results for an electron density with classical(red) and semi classical(blue) approaches.
(b): results for a scalar potential with classical(red) and semi classical(blue) approaches.

Case 4.

Boundary conditions:
$q\phi(x = 0) = 0.4$[ev], $q\phi(x = 1\mu\text{m}) = -0.28715$[ev]

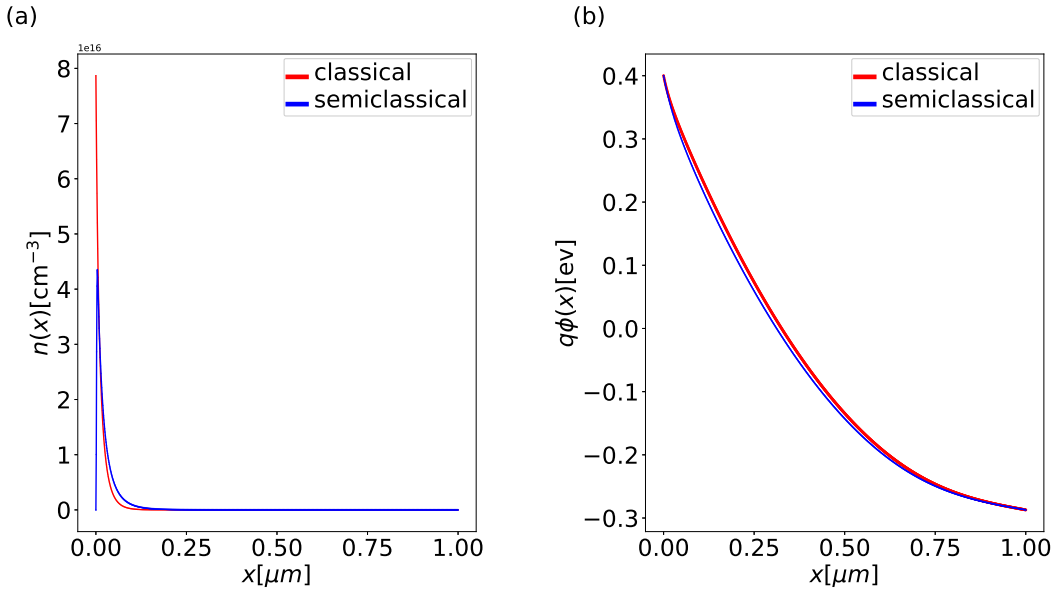

Figure 4: The plot for an electron density $n(x)$ and a scalar function $\phi(x)$.
(a): results for an electron density with classical(red) and semi classical(blue) approaches.
(b): results for a scalar potential with classical(red) and semi classical(blue) approaches.