

EE-620 Assignment 2 (29-01-2019)

1D Poisson numerical simulation:

(1) Perform a 1D numerical simulation of MOSCAP structure with poly Silicon gate (Note: Solve Poisson for entire structure i.e. gate/ oxide/ substrate. Choose thickness for gate and substrate such that depletion widths can be easily accommodated). The specifications are:

Substrate doping (N_A) = $1e16$; T_{OX} =5nm; N_{poly} = $5e19$.

Show band diagrams for accumulation, depletion and inversion bias conditions. [15 M]

(2) Obtain LFCV (No oxide and interface traps). Compare it with the one obtained in Assignment 1. [10 M]

(3) For N_{poly} = $5e19$, vary T_{OX} (3,5,7 nm) and show the effect on C-V. [10 M]

(4) For T_{OX} =5nm, vary N_{poly} ($5e19$, $1e19$, $5e18$) and show the effect on C-V. [10 M]

Following reference might be helpful.

Ref: <http://www-device.eecs.berkeley.edu/qmcv/>