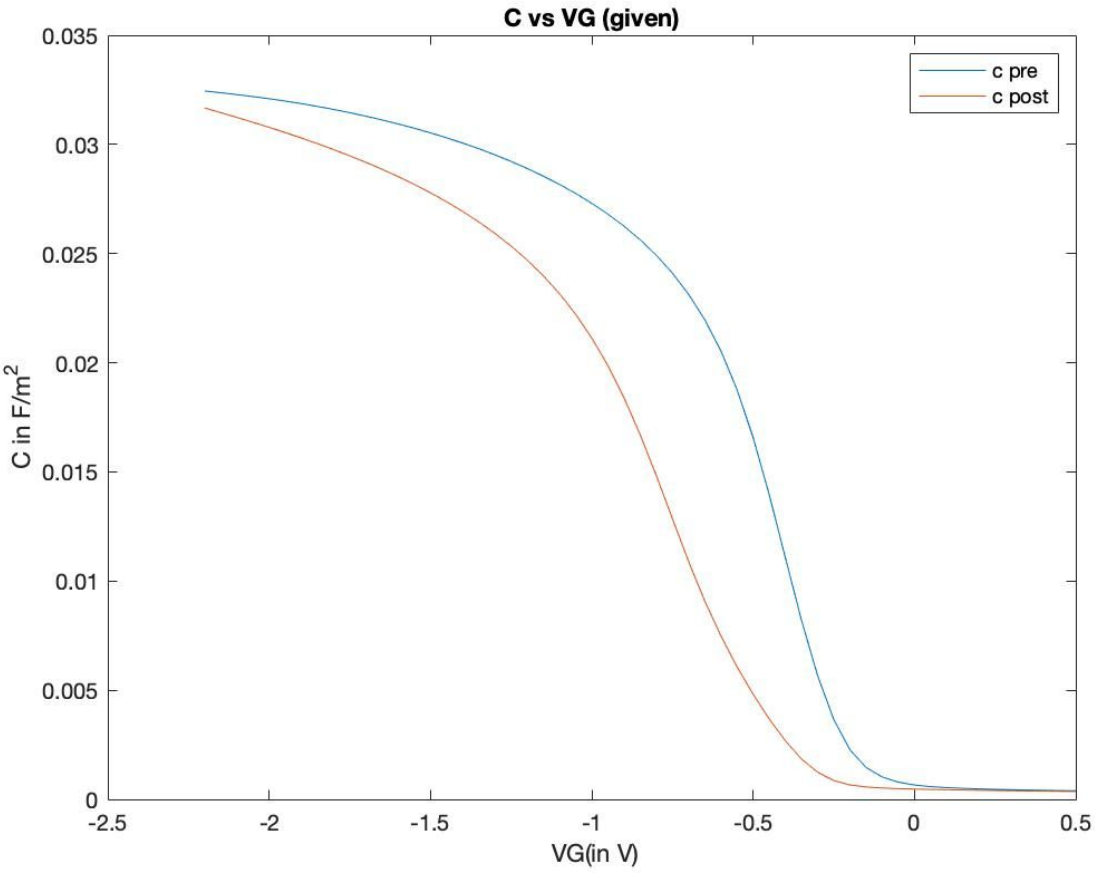
EE620 -Physics of Transistor

Assignment-4

-Devesh Kumar (16d070044)

Every parameter in graph is in SI units
Please insert the data in Data.m
As fabricated device is pre
And post stressed device is Post

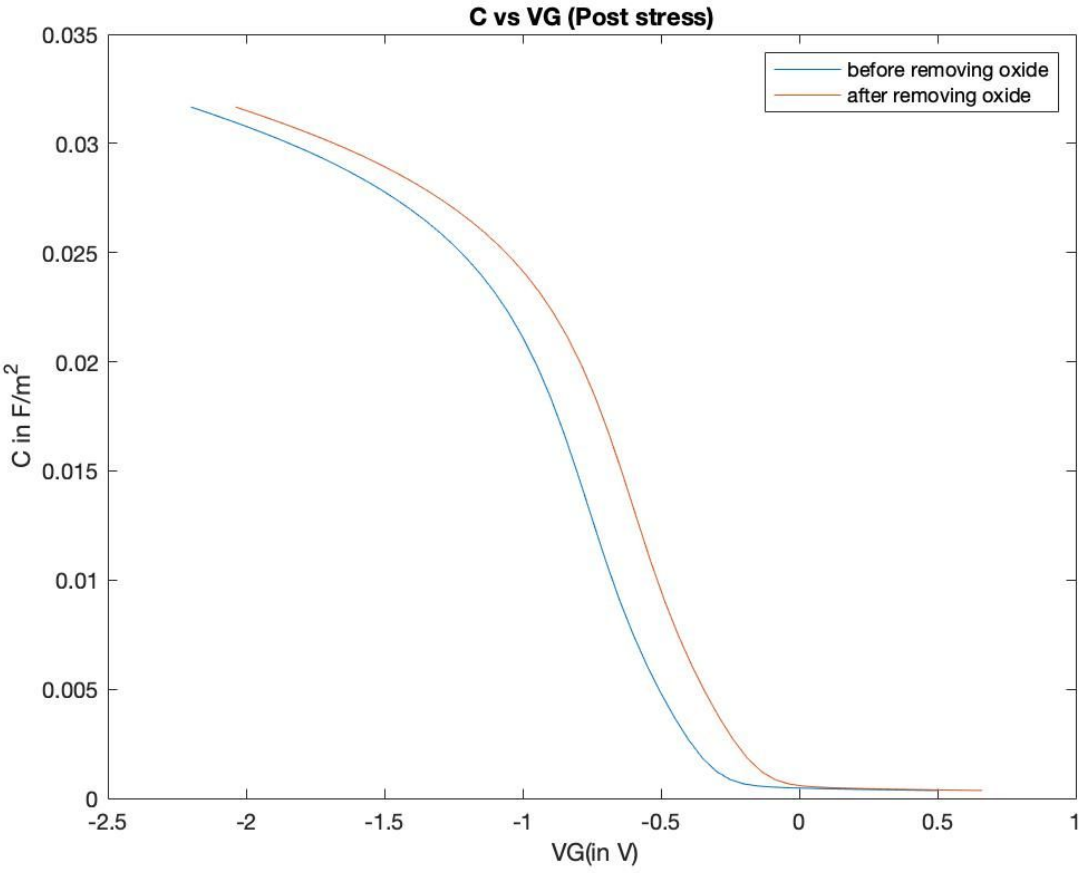


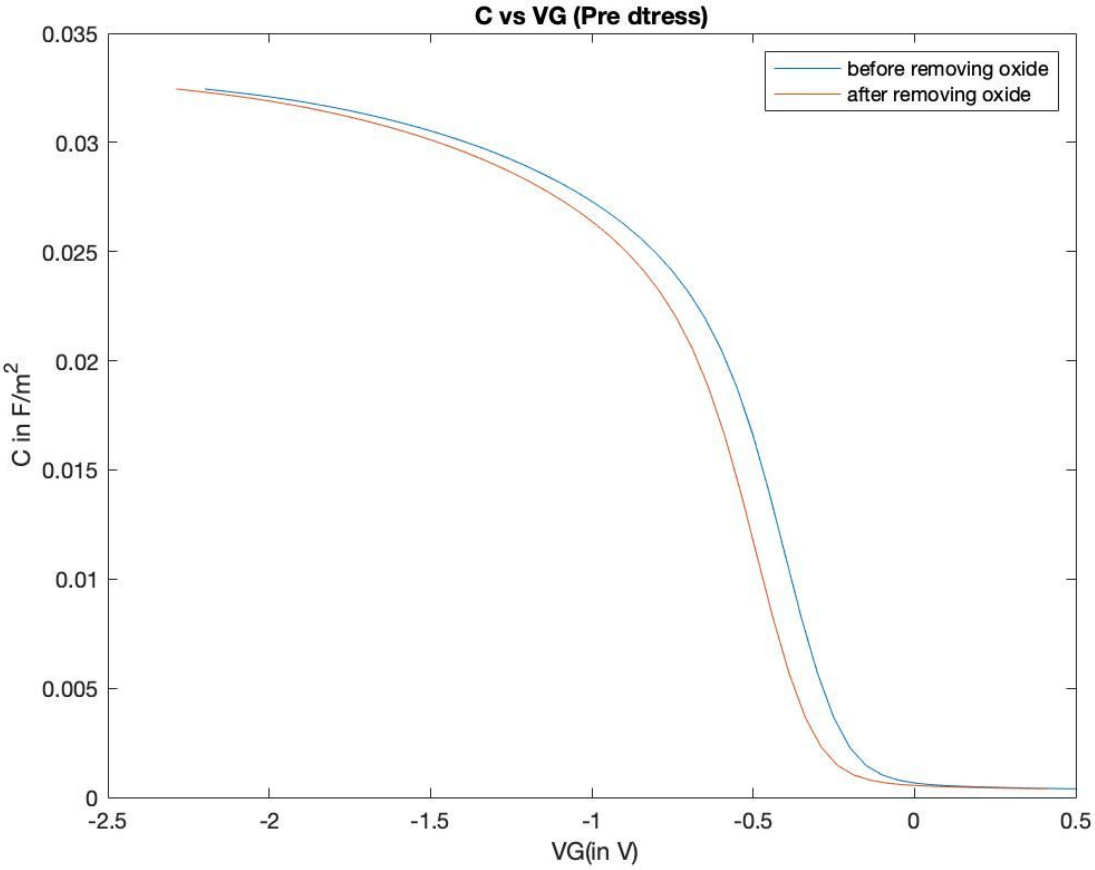
DOPING: 1.31900940000000e+22 / m^3
Cfb: 0.00273074294233495 SI units
Cmg:0.000552076339601112 SI units

	VFB(V)	VMG	VT
Ideal	-0.352309788957128	0.011959006637829	0.3699

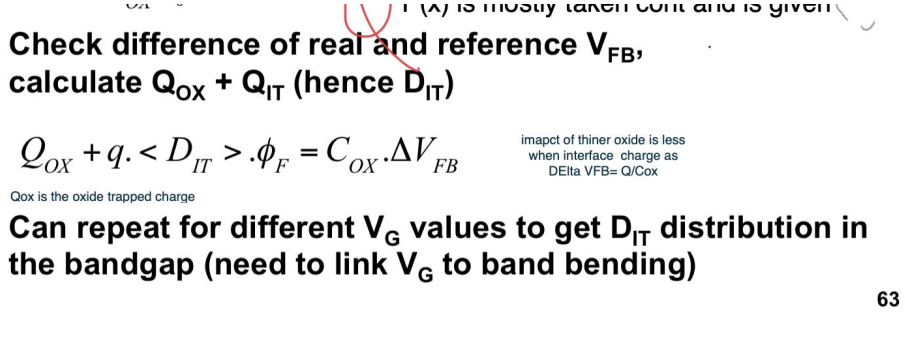
Pre stress	-0.200000000000000	0.100000000000000	0.3620
Post stress	-0.400000000000000	-0.150000000000000	0.1620

Oxide charges:
Pre stress:-0.00285682458541042 C
Post stress:0.005255375414590 C

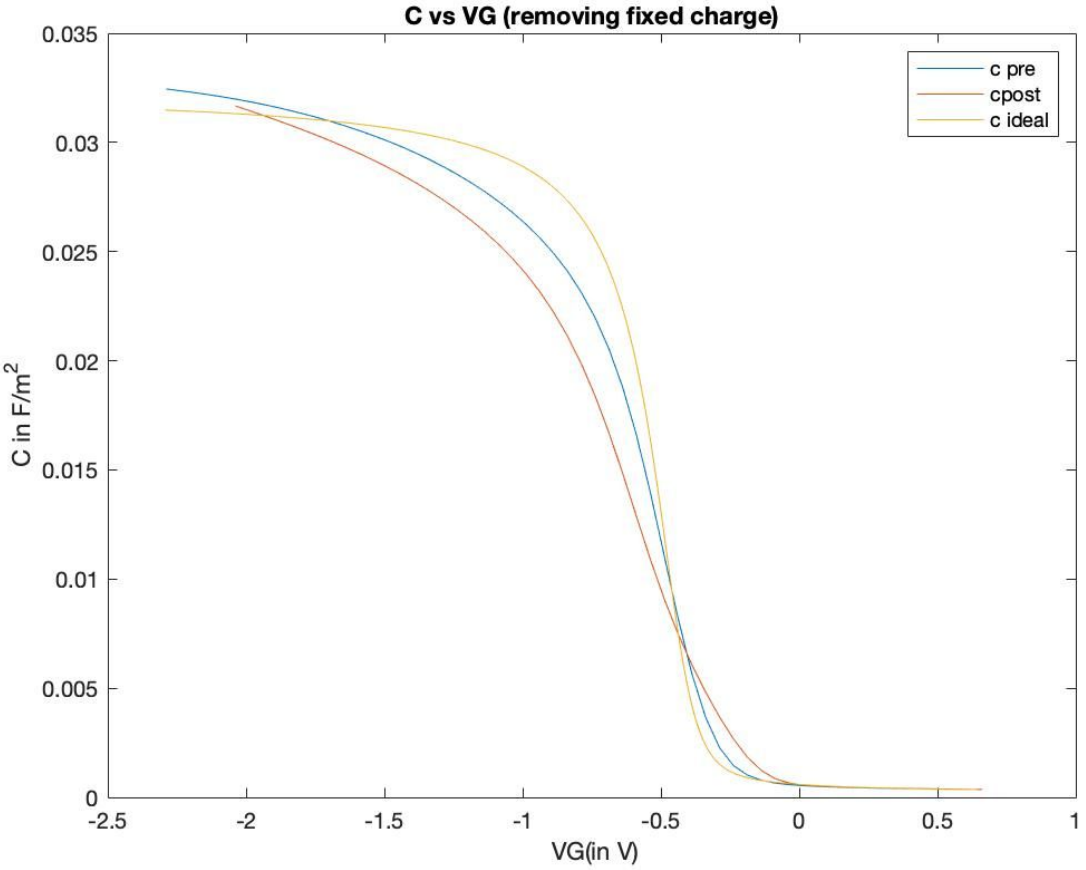




We can see from the below graph that the ideal curve touches curves with DIT even after mid band gap which should not be theoritically possible. Whih may happen due to non idealities So to make the dit graph error free I have taked only the portion that has c_low = 7.5840e-04 And c_high = 0.0310 thus limiting the value of vg. This again reduces the sweep of phi_s available for DIT calculation.
DIT formula used:

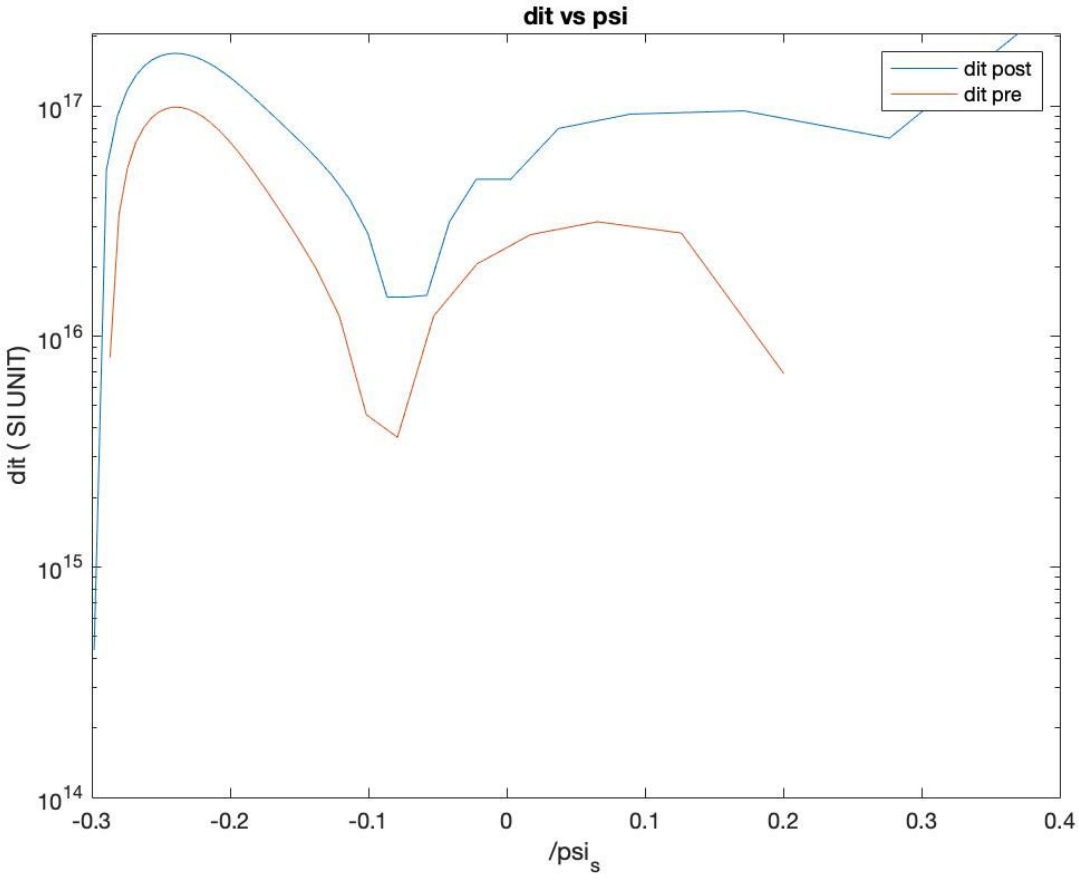


Replaceing Phi_f with Phi_s.



DIT Profile:

After removing charge due to oxide layer we get the above graph. Now the charges are due to dit only. For each c we find delta vg from the graph(ideal - post stress). From that we can find q due to Dit and which will be equal to q* dit*Psi_s. Psi_s will be corresponding to the Vg at that C.


dit vs psi
dit post
dit pre
10^{17}
10^{16}
10^{15}
10^{14}
dit (SI UNIT)
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
/psi$_s$