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Courses » Fundamentals of semiconductor devices

Announcements **Course** Ask a Question Progress FAQ

Unit 8 - Metal Oxide Semiconductor Capacitor

Register for
Certification exam

Course outline

How to access
the portal

Basics of
semiconductor
physics

Equilibrium
carrier
concentration

Carrier transport

p-n junction

Applications of
p-n junctions
and details of
metal-
semiconductor
junction

Bipolar Junction
Transistor

Metal Oxide
Semiconductor
Capacitor

MOS:
Introduction

MOS:
Capacitance-

week 7_Assignment

The due date for submitting this assignment has passed.

As per our records you have not submitted this **Due on 2019-03-20, 23:59 IST.**
assignment.

1) At Gallium-nitride – Silicon oxide interface, the ratio of electric field strength in the oxide to electric field strength in Gallium nitride is approximately (assume dielectric constant of GaN is 8 and that of silicon-dioxide is 4) **1 point**

- 0.5
 2
 1.414
 0.7072

No, the answer is incorrect.

Score: 0

Accepted Answers:

2

2) Calculate the maximum width of the surface depletion region of a MOSCAP with SiO₂-Si junction and $N_A = 10^{17} \text{ cm}^{-3}$ ($kT/q = 0.026 \text{ V}$, $n_i = 10^{10} \text{ cm}^{-3}$, $\xi_{\text{Si}} = 11.9 \times 8.85 \times 10^{-14} \text{ F/cm}$) **2 points**

- 1 μm
 10 μm
 5 μm
 0.1 μm

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.1 μm

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7_Assignment

Week
7_Assignment
Solution

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Compound
Semiconductors

Opto-electronic
devices: Solar
cells and photo-
detectors

Opto-electronic
devices: Light
Emitting Diodes
(LED)

Applications of
transistors and
basics of
microelectronic
fabrication

Threshold voltage of A = Threshold voltage of B

More information required

No, the answer is incorrect.

Score: 0

Accepted Answers:

Threshold voltage of A < Threshold voltage of B

4) Consider two MOSCAP's; MOSCAP A has p-type substrate and MOSCAP B has n-type substrate. If thickness of oxide in both the MOSCAP's are increased, which of the following statement is true about magnitude of threshold voltage? 1 point

Threshold Voltage of MOSCAP A increases while that of B reduces

Threshold Voltage of MOSCAP B increases while that of A reduces

Threshold Voltage of both MOSCAP's increase

Threshold Voltage of both MOSCAP's decrease

No, the answer is incorrect.

Score: 0

Accepted Answers:

Threshold Voltage of both MOSCAP's increase

5) Consider two MOSCAP's; MOSCAP A has p-type substrate and MOSCAP B has n-type substrate. If both the MOSCAP's have same amount of positive fixed oxide charge, which of the following statement is true about magnitude of threshold voltage? 1 point

Addition of fixed oxide charge increases threshold voltage of A

Addition of fixed oxide charge does not change the threshold voltage of B

Addition of fixed oxide charge decreases threshold voltage of A

Addition of fixed oxide charge does not change the threshold voltage of A

No, the answer is incorrect.

Score: 0

Accepted Answers:

Addition of fixed oxide charge decreases threshold voltage of A

6) The quantity, ϕ_F , is a critical parameter in MOS theory. What happens when the surface potential equals $2\phi_F$? 1 point

The majority carrier concentration at the surface equals the majority carrier concentration in the bulk

The majority carrier concentration at the surface equals the intrinsic carrier concentration, n_i

The minority carrier concentration at the surface equals the majority carrier concentration in the bulk

The minority carrier concentration at the surface equals the intrinsic carrier concentration, n_i

No, the answer is incorrect.

Score: 0

Accepted Answers:

The minority carrier concentration at the surface equals the majority carrier concentration in the bulk

7) What is a "donor like" surface state? 1 point

- A surface state that is neutral when filled.
- A surface state that is neutral when empty
- A surface state that dopes the semiconductor surface n-type
- A surface state cause by the presence of a phosphorus or arsenic atoms on the surface

No, the answer is incorrect.

Score: 0

Accepted Answers:

A surface state that is neutral when filled.

8) What effect does a metal-semiconductor work function difference have on a C(V) characteristic for an MOS capacitor?

1 point

- It increases the oxide capacitance.
- It decreases the oxide capacitance.
- It increases the inversion capacitance.
- It translates the C(VG) vs. VG characteristic to the left or right on the voltage axis

No, the answer is incorrect.

Score: 0

Accepted Answers:

It translates the C(VG) vs. VG characteristic to the left or right on the voltage axis

9) What is an "acceptor" like surface state?

1 point

- A state which is neutral when empty
- A state which is neutral when it is filled with electron
- A state that is positive when empty
- A state that is positive when filled

No, the answer is incorrect.

Score: 0

Accepted Answers:

A state which is neutral when empty

Previous Page

End

