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State	Finished
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Time taken	30 secs
Marks	8.00/8.00
Grade	10.00 out of 10.00 (100%)

Question 1

Correct
Mark 2.00 out of 2.00

The threshold voltage of a MOSFET increases with increase in the concentration of dopants in the channel of the MOSFET. A n-channel MOSFET channel is p-type doped, and a p-channel MOSFET channel is n-type doped. In a MOSFET fabrication process, the channel regions are first doped, and subsequently a silicon dioxide is film is grown by thermal oxidation. Match the statements below.

The actual threshold voltage of the n-channel MOSFET

will be lower than the threshold voltage estimated using the dopant profile obtained after the doping process.

The actual threshold voltage of the p-channel MOSFET

will be higher than the threshold voltage estimated using the dopant profile obtained after the doping process.

Your answer is correct.

The correct answer is: The actual threshold voltage of the n-channel MOSFET → will be lower than the threshold voltage estimated using the dopant profile obtained after the doping process., The actual threshold voltage of the p-channel MOSFET → will be higher than the threshold voltage estimated using the dopant profile obtained after the doping process.

Question 2

Correct
Mark 2.00 out of 2.00

Which of the following is (are) true for the diffusion of dopants in silicon?

- ☒ a. Built-in electric field in silicon enhances diffusion. ✓
- ☐ b. A built-in field will exist at temperatures at which the semiconductor is intrinsic.
- ☐ c. Built-in field will not effect the concentration profile of a dopant, the concentration of which is independent of position.

Your answer is correct.

The correct answer is: Built-in electric field in silicon enhances diffusion.

Question 3

Correct

Mark 1.00 out of 1.00

The kink and the extended tail in the diffusion profile of phosphorous can be attributed to

- ☐ a. Diffusion enhancement by electric field.
- ☐ b. vacancy assisted diffusion.
- ☒ c. interstitial assisted diffusion. ✓

Your answer is correct.

The correct answer is: interstitial assisted diffusion.

Question 4

Correct

Mark 1.00 out of 1.00

Which of the following statements are true for the diffusion of n-type dopants in silicon?

- ☐ a. Antimony diffusion in an oxidizing ambient enhances diffusion.
- ☒ b. Arsenic diffusion in an oxidizing ambient enhances diffusion. ✓
- ☒ c. Phosphorous diffusion in an oxidizing ambient enhances diffusion. ✓

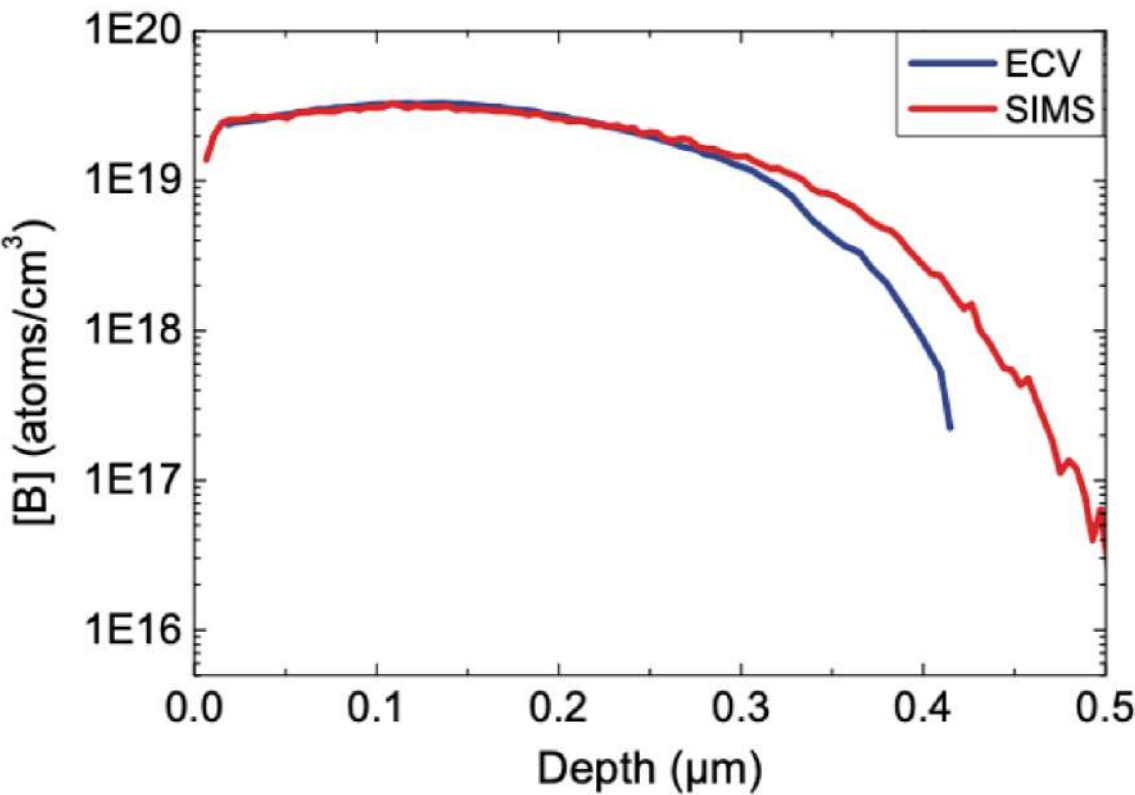
Your answer is correct.

The correct answers are: Phosphorous diffusion in an oxidizing ambient enhances diffusion. , Arsenic diffusion in an oxidizing ambient enhances diffusion.

Question 5

Correct
Mark 1.00 out of 1.00

Boron can be diffused into silicon using BBr₃ as a source. The dopant profiles obtained for a typical diffusion process are shown in the figure below. Which of the following statements are correct?



Ref.:
STUDY ON BORON EMITTER FORMATION BY BBR₃ DIFFUSION FOR N-TYPE SI SOLAR CELL APPLICATIONS, Y. Schiele et al., Proc. of the 28th EU PVSEC , 2013, pages 1242-1247.

- ☐ a. Beyond 300 nm depth, boron activation is more than 100%.
- ☒ b. The boron diffusion seems to be dominated by concentration dependent diffusivity. ✓
- ☒ c. In contrast to the case of phosphorous, boron is nearly fully activated near the surface. ✓

Your answer is correct.
The correct answers are: The boron diffusion seems to be dominated by concentration dependent diffusivity., In contrast to the case of phosphorous, boron is nearly fully activated near the surface.

Question 6

Correct
Mark 1.00 out of 1.00

Poly-Si strips are used for fabrication of resistors in VLSI chips. The sheet resistance of a phosphorous layer was determined as 100 Ω/sq. What is the resistance of a strip of 3 μm length and 0.5 μm width, in Ω?

Answer: 600 ✓

The correct answer is: 600