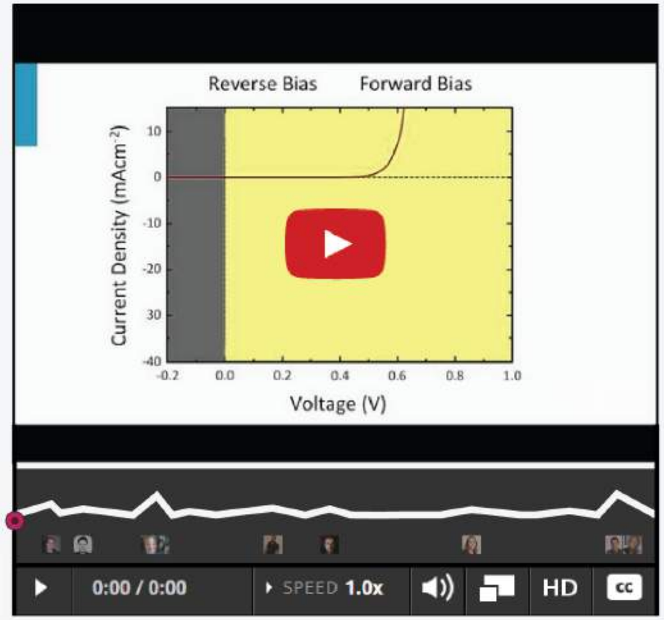
# THE SOCIAL EXPERIENCE IN ONLINE COURSES

PHYSICAL PART BY
EMMA HEITBRINK

## SOLAR CELL OPERATION




### Notifications

**Participating**
*No questions*

**Following**
*No questions*

**General**
- **For the online students** - edX

### Discussion

New

**0:36| About Voltage** - Saquin

I have a question about voltage. becouse you said that if the ecuations is close 0 the voltage it is more negative. But this means the ampere is to small to generate energy? in which cases is posible has a negative voltage?

▶ View

**1:12| Something must be wrong with the signs in the equation of total current density** - Omar-the-knight

The coorect equation should be like the one we have seen in assignment 2.8 J(V)=J0(exp(qV/kT)−1)−Jph because in the equation presented in the lecture and the slides J(V)=... Jph - J0(exp(qV/kT)−1) From the graph we see clearly that at V = 0 Jph is a negative as it's around -35 mA/cm2 If Jph is negative and the J0 is positive so above 0 the slope should be going down instead of up because the - J0 will end up to be a negative number that adds to the current of the solar cell On the other hand If the J0 is negative then (in the dark) the slope should be going down because J0 will be negative However the equation in 2.8 question has no such defect because when the diode is in the dark Jph = 0 and so J(V)=J0(exp(qV/kT)−1) and that goes along with the first red curve and also when the diode is illuminated the curve shifts down by an amount of (-Jph) I hope that if this is a mistake that you will correct in the next version of the course. However, If I am mistaken please give me the correct answer and thanks in advance

▶ View

**2:22| The polarity of the Battery Terminals in forward and reverse bias** - arunrpatel

Am I wrong? During the lecture the graphic displays shows the polarity changes according to forward and reverse bias for the diode. But at the same time Battery terminal polarity stays same. It should change too. I think the long line for positive and a short line for negative. Correct me if I am wrong.

▶ View

**2:25| I don't understand the diagram** - JMcGlynn -

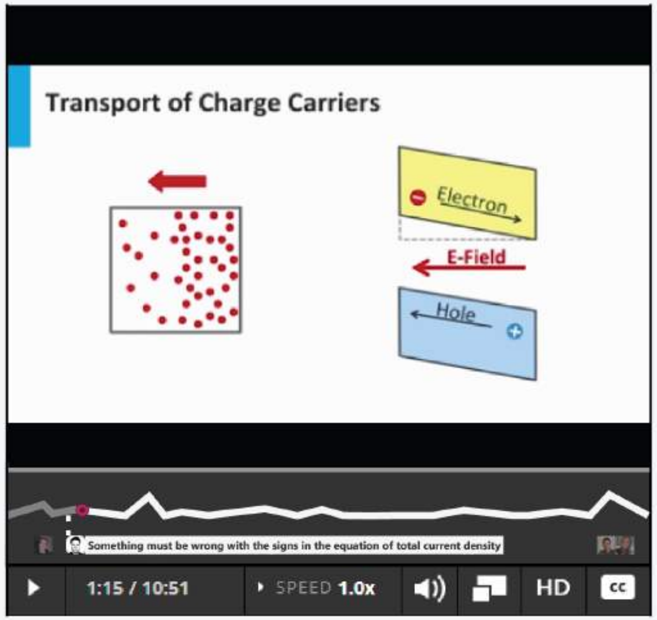
What do each of these represent in page 10 of the slides:
1 The open circles on the right-side of the circuit
2 The right-pointing black arrow on the top line
3 The downward-pointing black arrow on the vertical line
4 The moving red dot

Also, once the symbols are explained, how do we read this circuit or understand how it operates? Thank you.

▶ View

**3:38| Is "exp" equivalent to "e" in this lecture?** - JMcGlynn

## SOLAR CELL OPERATION




In p-type the holes are the majority charge carriers and in n-type the electrons are the majority charge carriers.

If we have semiconductors in which one part is doped p-type and another part is doped n-type,

we have created a so-called pn-junction.

**We have also seen that two different mechanisms control the transport of charge carriers in semiconductors:**

diffusion and drift.

Diffusion is controlled by a density gradient, whereas drift is controlled by electric fields,

which you can build in the p-n junction or apply externally.

In a pn junction the diffusion of majority charge carriers through the

### Notifications

**Participating**
*No questions*

**Following**
*No questions*

**General**
- **For the online students** - edX

### Discussion

New

Take a break to view discussion

Notifications

Participating

*No questions*

Following

*No questions*

General

**For the online students** - edX

Question

Back to discussion

**1:22 Something must be wrong with the signs in the equation of total current density -** Omar-the-knight

The coorect equation should be like the one we have seen in assignment 2.8 J(V)=J0(exp(qV/kT)−1)−Jph because in the equation presented in the lecture and the slides J(V)= Jph - J0(exp(qV/kT)−1) From the graph we see clearly that at V = 0 Jph is a negative as it's around -35 mA/cm2 If Jph is negative and the J0 is positive so above 0 the slope should be going down instead of up because the - J0 will end up to be a negative number that adds to the current of the solar cell.

Omar-the-knight

On the other hand If the J0 is negative then (in the dark) the slope should be going down because J0 will be negative. However the equation in 2.8 question has no such defect because when the diode is in the dark Jph = 0 and so J(V)=J0(exp(qV/kT)−1) and that goes along with the first red curve and also when the diode is illuminated the curve shifts down by an amount of (-Jph)

Omar-the-knight

I hope that if this is a mistake that you will correct in the next version of the course. However, If I am mistaken please give me the correct answer and thanks in advance

**B** *I*

Submit

Cancel

## Notifications

### Participating

*No questions*

### Following

0 **Something must be wrong with the signs in the equation of total current density** - Omar-the-knight

### General

**For the online students** - edX

## Question

Back to discussion

**1:22 Something must be wrong with the signs in the equation of total current density -** Omar-the-knight

The coorect equation should be like the one we have seen in assignment 2.8 J(V)=J0(exp(qV/kT)−1)−Jph because in the equation presented in the lecture and the slides J(V)= Jph - J0(exp(qV/kT)−1) From the graph we see clearly that at V = 0 Jph is a negative as it's around -35 mA/cm2 If Jph is negative and the J0 is positive so above 0 the slope should be going down instead of up because the - J0 will end up to be a negative number that adds to the current of the solar cell.

Omar-the-knight

On the other hand If the J0 is negative then (in the dark) the slope should be going down because J0 will be negative. However the equation in 2.8 question has no such defect because when the diode is in the dark Jph = 0 and so J(V)=J0(exp(qV/kT)−1) and that goes along with the first red curve and also when the diode is illuminated the curve shifts down by an amount of (-Jph)

Omar-the-knight

I hope that if this is a mistake that you will correct in the next version of the course. However, If I am mistaken please give me the correct answer and thanks in advance

B I

Submit

Cancel

## Notifications

### Participating

*No questions*

### Following

0 **Something must be wrong with the signs in the equation of total current density** - Omar-the-knight

### General

**For the online students** - edX

## Discussion

New

2:25 | **I don't understand the diagram** - JMcGlynn -

What do each of these represent in page 10 of the slides:
1 The open circles on the right-side of the circuit
2 The right-pointing black arrow on the top line
3 The downward-pointing black arrow on the vertical line
4 The moving red dot

Also, once the symbols are explained, how do we read this circuit or understand how it operates? Thank you.

View

3:38 | **Is "exp" equivalent to "e" in this lecture?** - JMcGlynn

Is this equation correct?
I=IDARK=I0(eqVkBT−1)

View chat

4:12 | **equivalent circuit** - ramcy

the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open circuit voltage gets involved here in any way? also why is the source connected in parallel with the diode? thank you

View chat

5:22 | **solar cell operation** - suprabhath

sir, very nice lectures, well edited and structured. Density and current are directly related with each other for a given area. Then, why we switched into JV curve instead of IV curve for further explain?. Thank you

View chat

5:49 | **False use of symbol for batterysupply** - KapEastwoodNL

On slide 6 of this course item (reversed biasing) the long side of the battery symbol, indicating the + pole of the power suppy is on the left side as is on slide 6 which is for forward biasing. The + and - on top of the slides are here correct. In week 2 for the reversed biasing both baterysymbol as well as the + and - on the top were placed wrong !

View chat

6:47 | **Graphics interpretation problem** - odiseo

the video is great.am i right in finally saying that,since the light forms the source here which causes the

## Notifications

### Participating

*No questions*

### Following

0 **Something must be wrong with the signs in the equation of total current density** - Omar-the-knight

### General

**For the online students** - edX

## Discussion

New

2:25 | **I don't understand the diagram** - JMcGlynn -

What do each of these represent in page 10 of the slides:
1 The open circles on the right-side of the circuit
2 The right-pointing black arrow on the top line
3 The downward-pointing black arrow on the vertical line
4 The moving red dot

Also, once the symbols are explained, how do we read this circuit or understand how it operates? Thank you.

View

3:38 | **Is "exp" equivalent to "e" in this lecture?** - JMcGlynn

Is this equation correct?
I=IDARK=I0(eqVkBT−1)

View chat

4:12 | **equivalent circuit** - ramcy

the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open circuit voltage gets involved here in any way? also why is the source connected in parallel with the diode? thank you

View chat

5:22 | **solar cell operation** - suprabhath

sir, very nice lectures, well edited and structured. Density and current are directly related with each other for a given area. Then, why we switched into JV curve instead of IV curve for further explain?. Thank you

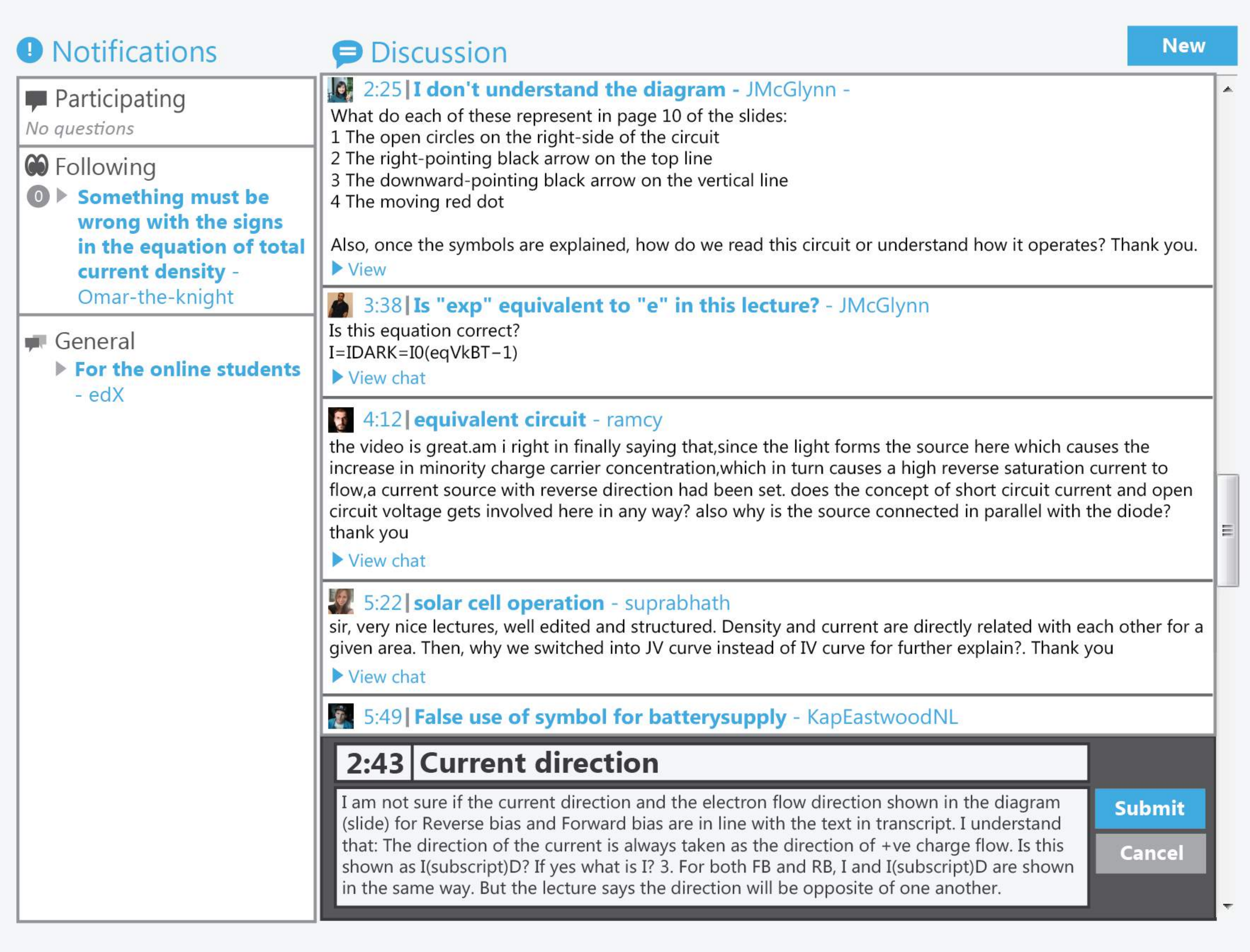
View chat

5:49 | **False use of symbol for batterysupply** - KapEastwoodNL

2:43

Submit

Cancel


Notifications
Discussion
New
Participating
No questions
Following
0
Something must be wrong with the signs in the equation of total current density - Omar-the-knight
General
For the online students - edX
2:25 | I don't understand the diagram - JMcGlynn -
What do each of these represent in page 10 of the slides:
1 The open circles on the right-side of the circuit
2 The right-pointing black arrow on the top line
3 The downward-pointing black arrow on the vertical line
4 The moving red dot
Also, once the symbols are explained, how do we read this circuit or understand how it operates? Thank you.
View
3:38 | Is "exp" equivalent to "e" in this lecture? - JMcGlynn
Is this equation correct?
I=IDARK=I0(eqVkBT−1)
View chat
4:12 | equivalent circuit - ramcy
the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open circuit voltage gets involved here in any way? also why is the source connected in parallel with the diode? thank you
View chat
5:22 | solar cell operation - suprabhath
sir, very nice lectures, well edited and structured. Density and current are directly related with each other for a given area. Then, why we switched into JV curve instead of IV curve for further explain?. Thank you
View chat
5:49 | False use of symbol for batterysupply - KapEastwoodNL
2:43 | Current direction
I am not sure if the current direction and the electron flow direction shown in the diagram (slide) for Reverse bias and Forward bias are in line with the text in transcript. I understand that: The direction of the current is always taken as the direction of +ve charge flow. Is this shown as I(subscript)D? If yes what is I? 3. For both FB and RB, I and I(subscript)D are shown in the same way. But the lecture says the direction will be opposite of one another.
Submit
Cancel

## Notifications

### Participating

0 Current direction - eheitbrink

### Following

0 Something must be wrong with the signs in the equation of total current density - Omar-the-knight

### General

For the online students - edX

## Discussion

New

**2:43 | Current direction** - eheitbrink

I am not sure if the current direction and the electron flow direction shown in the diagram (slide) for Reverse bias and Forward bias are in line with the text in transcript. I understand that: The direction of the current is always taken as the direction of +ve charge flow. Is this shown as I(subscript)D? If yes what is I? 3. For both FB and RB, I and I(subscript)D are shown in the same way. But the lecture says the direction will be opposite of one another.

View chat

**3:38 | Is "exp" equivalent to "e" in this lecture?** - JMcGlynn

Is this equation correct?

I=IDARK=I0(eqVkBT−1)

View chat

**4:12 | equivalent circuit** - ramcy

the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open circuit voltage gets involved here in any way? also why is the source connected in parallel with the diode? thank you

View chat

**5:22 | solar cell operation** - suprabhath

sir, very nice lectures, well edited and structured. Density and current are directly related with each other for a given area. Then, why we switched into JV curve instead of IV curve for further explain?. Thank you

View chat

**5:49 | False use of symbol for batterysupply** - KapEastwoodNL

On slide 6 of this course item (reversed biasing) the long side of the battery symbol, indicating the + pole of the power suppy is on the left side as is on slide 6 which is for forward biasing. The + and - on top of the slides are here correct. In week 2 for the reversed biasing both baterysymbol as well as the + and - on the top were placed wrong !

View chat

**6:47 | Graphics interpretation problem** - odiseo

the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open

## Notifications

### Participating

3 **Current direction -** eheitbrink

### Following

0 **Something must be wrong with the signs in the equation of total current density** - Omar-the-knight

### General

**For the online students** - edX

## Discussion

New

Take a break to view discussion

Notifications

Participating

3 **Current direction -** eheitbrink

Following

0 **Something must be wrong with the signs in the equation of total current density -** Omar-the-knight

General

**For the online students** - edX

Question

◂ Back to discussion

**2:43 Current direction -** eheitbrink

I am not sure if the current direction and the electron flow direction shown in the diagram (slide) for Reverse bias and Forward bias are in line with the text in transcript. I understand that: The direction of the current is always taken as the direction of +ve charge flow. Is this shown as I(subscript)D?

If yes what is I? 3. For both FB and RB, I and I(subscript)D are shown in the same way. But the lecture says the direction will be opposite of one another.

Yalda87

ID is the dark current and I is just current. Indeed the direction of the current ID should change in the video but it doesn't. What is still correct is the direction in which the electron flows (which is in the opposite direction of the current).

Yalda87

So under reverse bias, the current is from bottom to up, and under forward bias the current is from up to bottom through the diode. The current under forward bias (from up to bottom, in the direction of the diode) is much higher than under reverse bias. Hope this clears it up a bit.

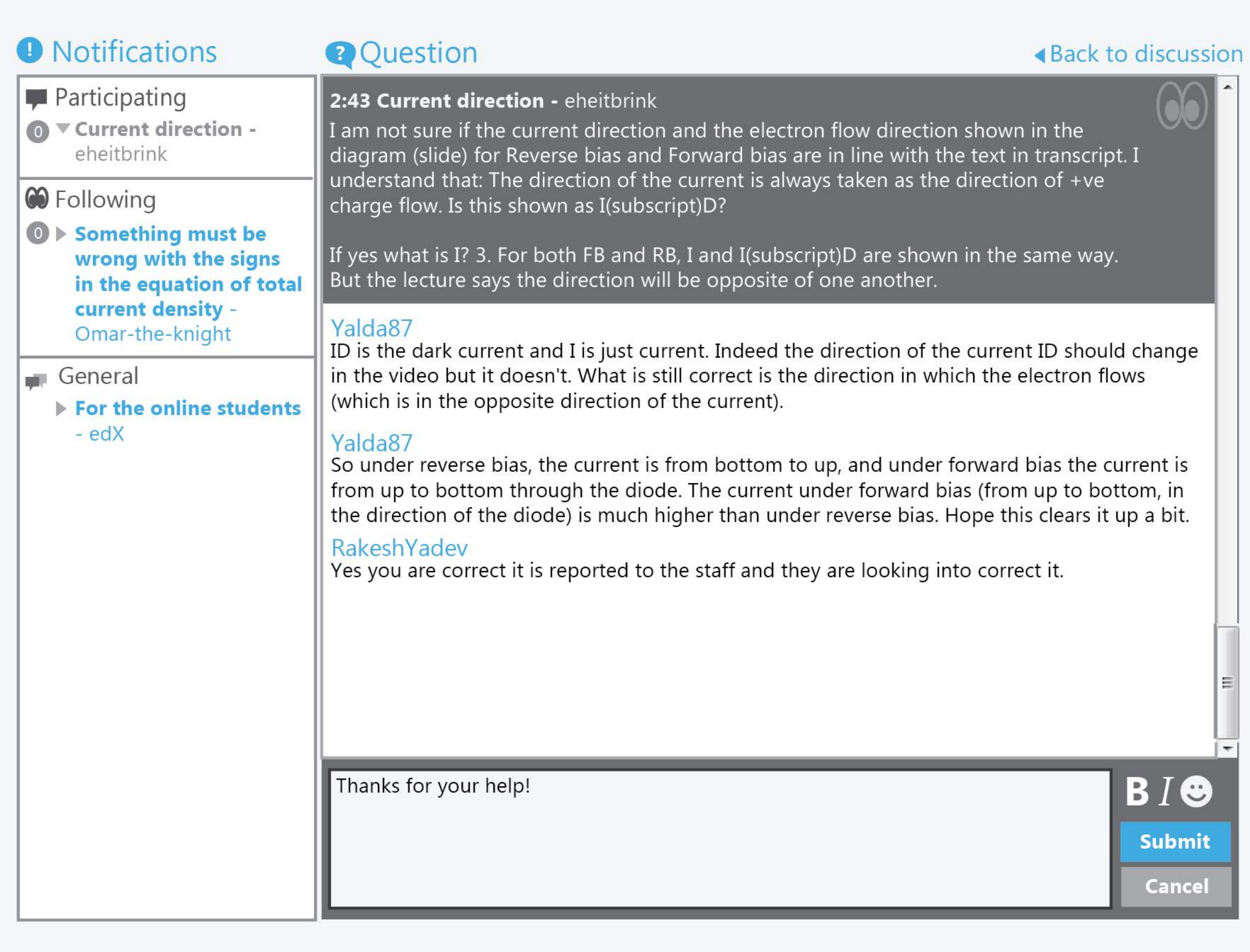
RakeshYadev

Yes you are correct it is reported to the staff and they are looking into correct it.

B I

Submit

Cancel


Notifications
Participating
0 Current direction - eheitbrink
Following
0 Something must be wrong with the signs in the equation of total current density - Omar-the-knight
General
For the online students - edX
Question
Back to discussion
2:43 Current direction - eheitbrink
I am not sure if the current direction and the electron flow direction shown in the diagram (slide) for Reverse bias and Forward bias are in line with the text in transcript. I understand that: The direction of the current is always taken as the direction of +ve charge flow. Is this shown as I(subscript)D?
If yes what is I? 3. For both FB and RB, I and I(subscript)D are shown in the same way. But the lecture says the direction will be opposite of one another.
Yalda87
ID is the dark current and I is just current. Indeed the direction of the current ID should change in the video but it doesn't. What is still correct is the direction in which the electron flows (which is in the opposite direction of the current).
Yalda87
So under reverse bias, the current is from bottom to up, and under forward bias the current is from up to bottom through the diode. The current under forward bias (from up to bottom, in the direction of the diode) is much higher than under reverse bias. Hope this clears it up a bit.
RakeshYadev
Yes you are correct it is reported to the staff and they are looking into correct it.
Thanks for your help!
B I
Submit
Cancel

## Notifications

**Participating**

0 **Current direction -** eheitbrink

**Following**

0 **Something must be wrong with the signs in the equation of total current density -** Omar-the-knight

**General**

**For the online students** - edX

## Question

Back to discussion

**2:43 Current direction -** eheitbrink

I am not sure if the current direction and the electron flow direction shown in the diagram (slide) for Reverse bias and Forward bias are in line with the text in transcript. I understand that: The direction of the current is always taken as the direction of +ve charge flow. Is this shown as I(subscript)D?

If yes what is I? 3. For both FB and RB, I and I(subscript)D are shown in the same way. But the lecture says the direction will be opposite of one another.

Yalda87

ID is the dark current and I is just current. Indeed the direction of the current ID should change in the video but it doesn't. What is still correct is the direction in which the electron flows (which is in the opposite direction of the current).

Yalda87

So under reverse bias, the current is from bottom to up, and under forward bias the current is from up to bottom through the diode. The current under forward bias (from up to bottom, in the direction of the diode) is much higher than under reverse bias. Hope this clears it up a bit.

RakeshYadev

Yes you are correct it is reported to the staff and they are looking into correct it.

**eheitbrink**

Thanks for your help!

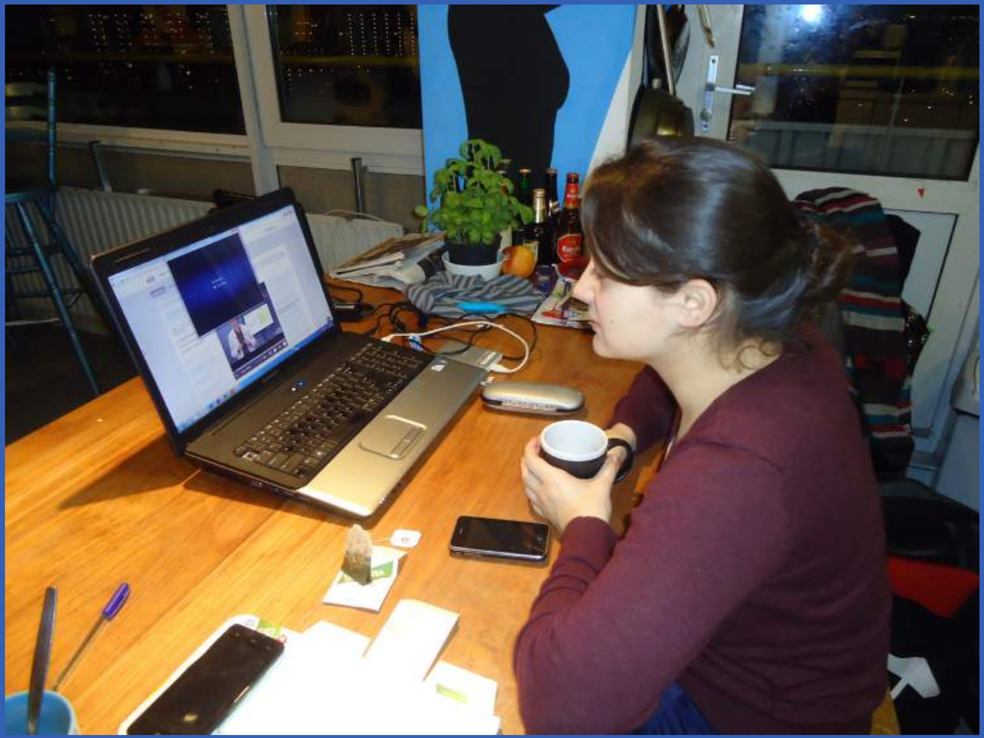
**B** *I*

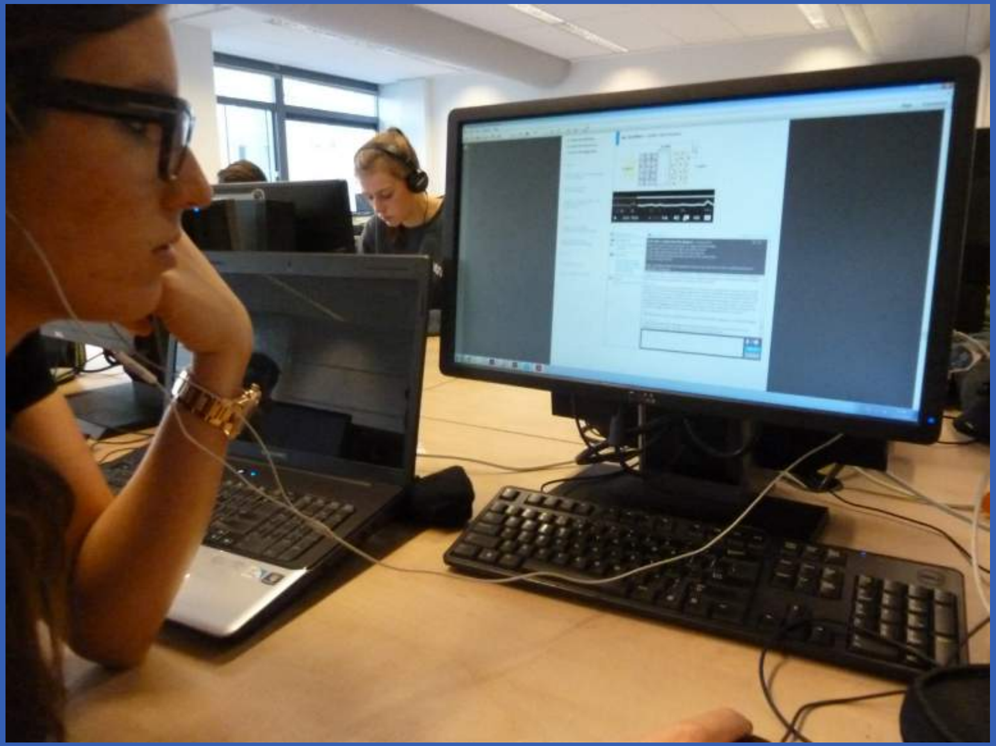
Submit

Cancel

# EVALUATION

## 1 EXPLORING CURRENT SITUATION
## 2 EXPLORING NEW SITUATION





# EVALUATION

## 1 EXPLORING CURRENT SITUATION
## 2 EXPLORING NEW SITUATION

# VIDEO LARGE IMPACT

# EVALUATION

## 1 EXPLORING CURRENT SITUATION
## 2 EXPLORING NEW SITUATION

# VIDEO LARGE IMPACT

# DISCUSSION USEFUL FEATURES

# CONCLUSION

**STUDENTS DO FEEL MORE INVOLVED WHEN FOLLOWING AN ONLINE COURSE.**

# CONCLUSION

## STUDENTS DO FEEL MORE INVOLVED WHEN FOLLOWING AN ONLINE COURSE.

### ALTHOUGH THE INTENSITY WILL DIFFER PER PERSON AND SITUATION

# WRAP-UP

## AND WHAT'S IN IT FOR EDX?

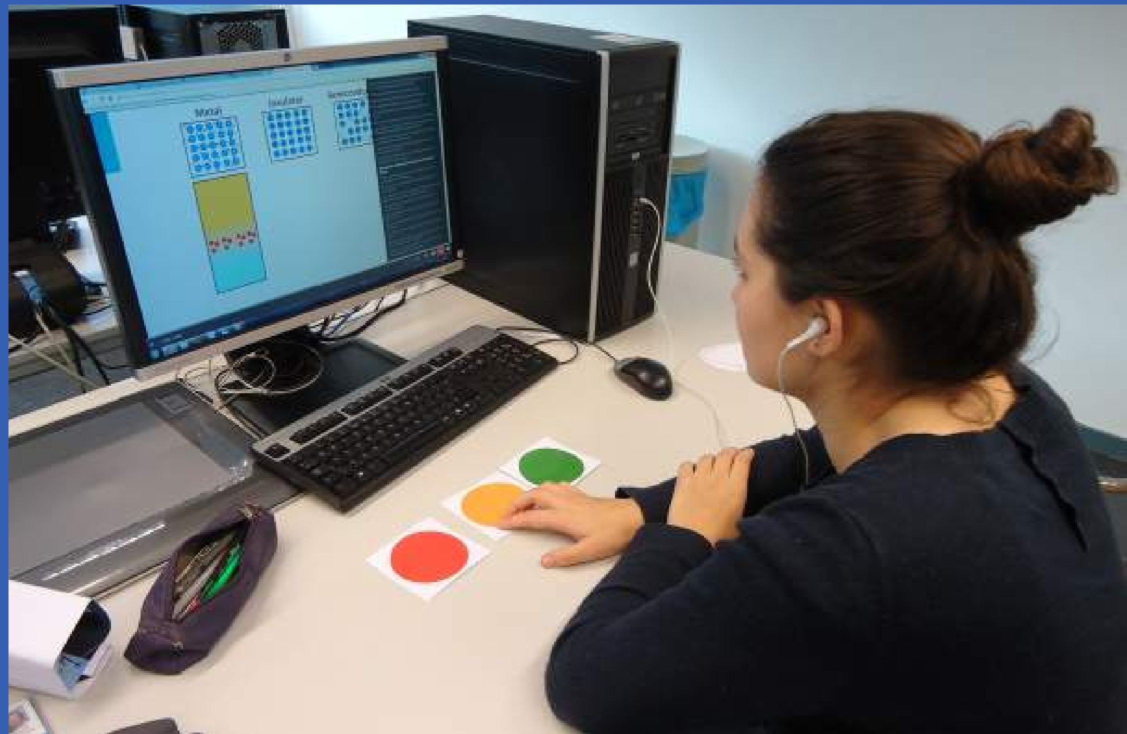
# SOCIAL EXPERIENCE IN ONLINE COURSES

**LET STUDENTS FEEL MORE INVOLVED WHEN FOLLOWING AN ONLINE COURSE.**

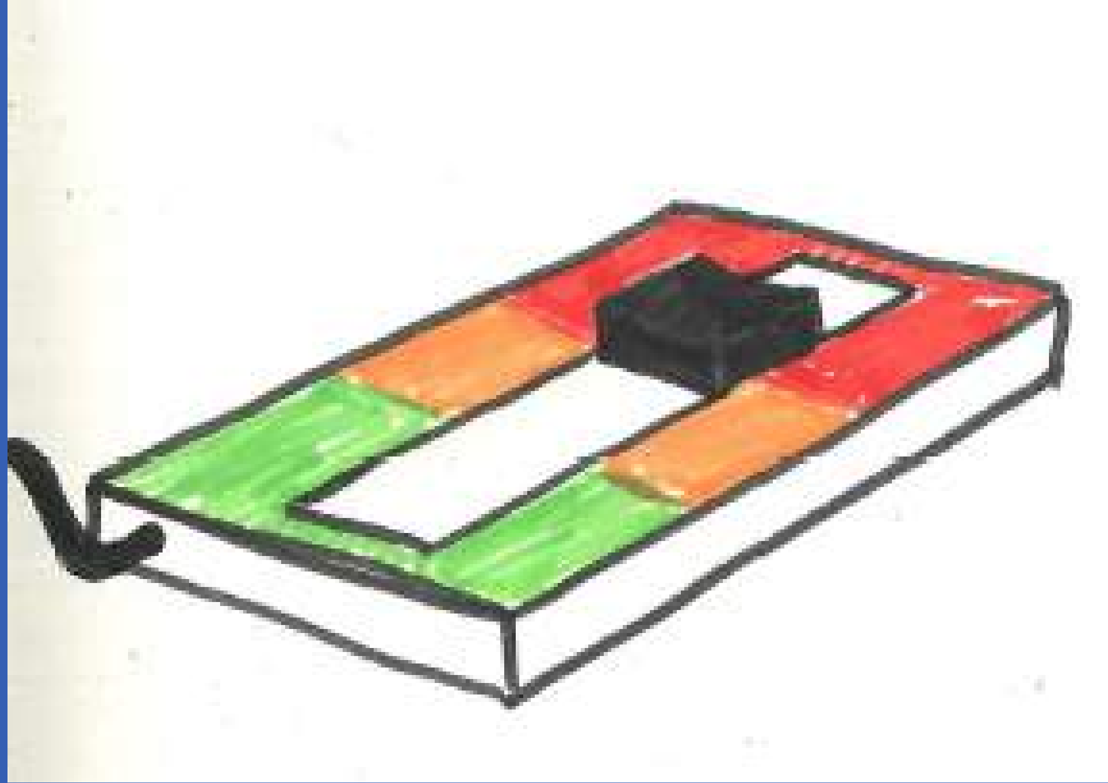
**I WANT TO INVOLVE THE STUDENTS BY CREATING SOCIAL MOMENTS AND MAKE THE ONLINE EXPERIENCE MORE DYNAMIC**

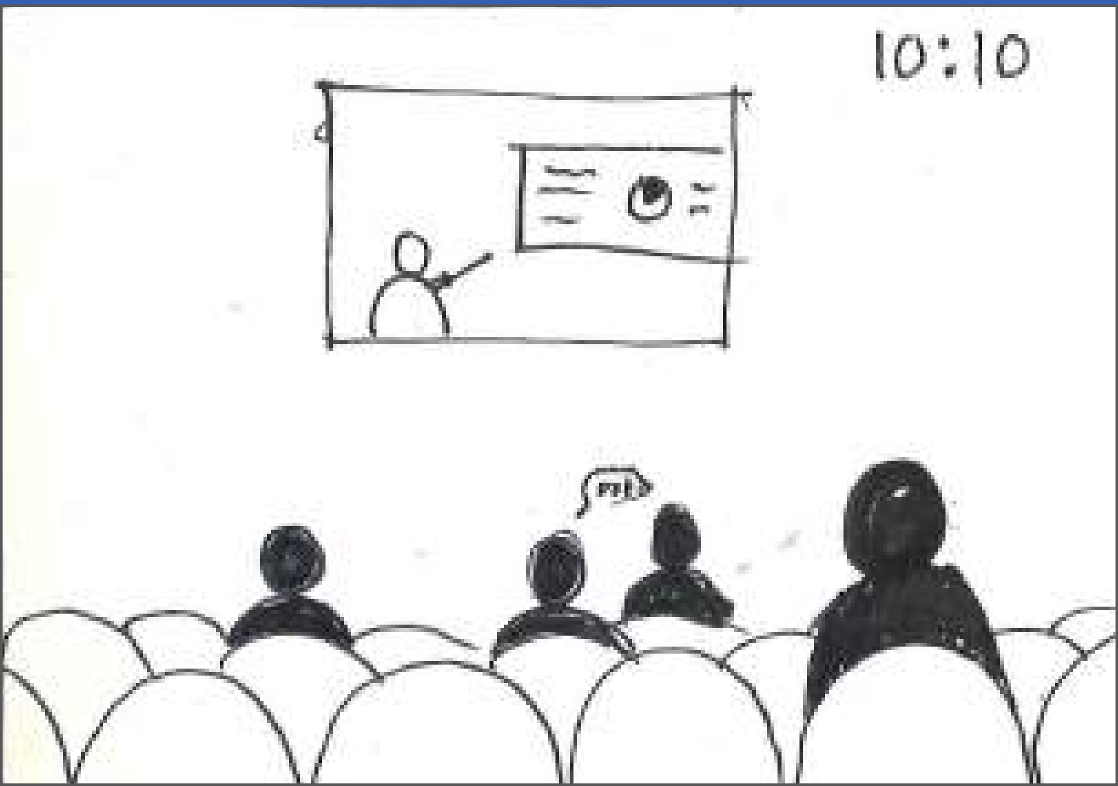
# RESEARCH

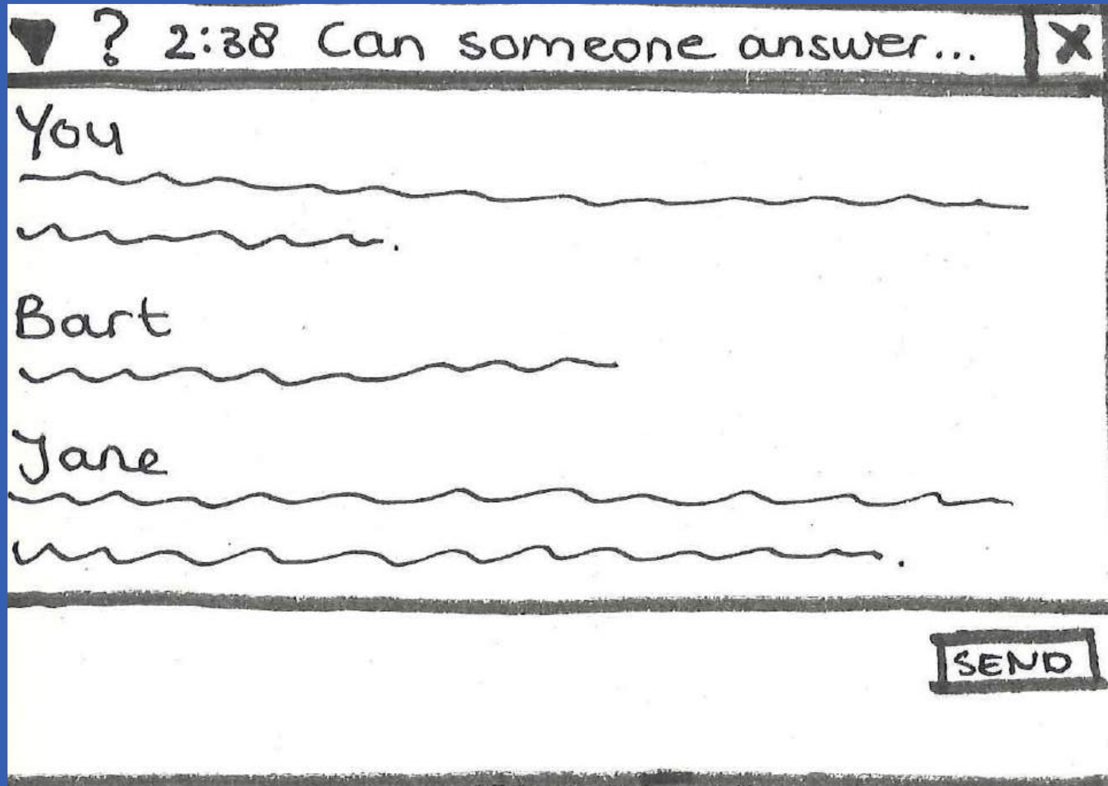
# Testing

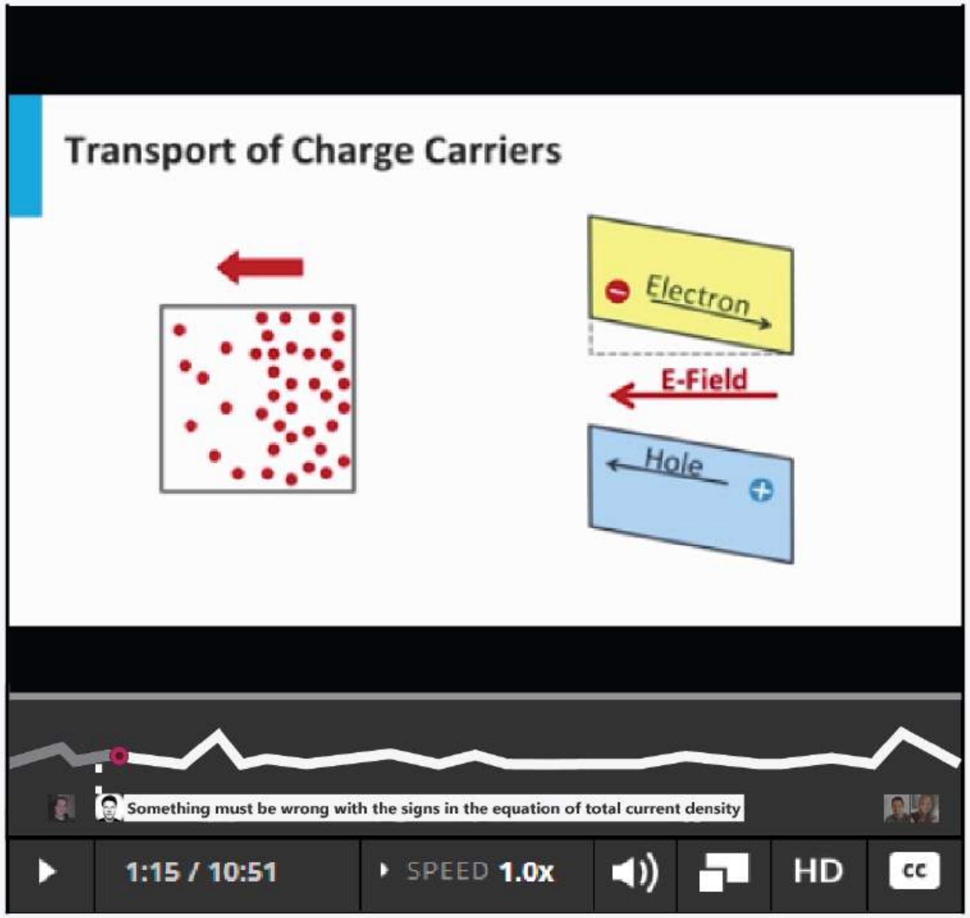
# Iterations





## SOLAR CELL OPERATION




In p-type the holes are the majority charge carriers and in n-type the electrons are the majority charge carriers.

If we have semiconductors in which one part is doped p-type and another part is doped n-type,

we have created a so-called pn-junction.

**We have also seen that two different mechanisms control the transport of charge carriers in semiconductors:**

diffusion and drift.

Diffusion is controlled by a density gradient, whereas drift is controlled by electric fields,

which you can build in the p-n junction or apply externally.

In a pn junction the diffusion of majority charge carriers through the

Notifications

Discussion

New

**Participating**

0 **Current direction** - eheitbrink

**Following**

0 **Something must be wrong with the signs in the equation of total current density** - Omar-the-knight

**General**

**For the online students** - edX

2:43 | **Current direction** - eheitbrink

I am not sure if the current direction and the electron flow direction shown in the diagram (slide) for Reverse bias and Forward bias are in line with the text in transcript. I understand that: The direction of the current is always taken as the direction of +ve charge flow. Is this shown as I(subscript)D? If yes what is I? 3. For both FB and RB, I and I(subscript)D are shown in the same way. But the lecture says the direction will be opposite of one another.

View chat

3:38 | **Is "exp" equivalent to "e" in this lecture?** - JMcGlynn

Is this equation correct?

I=IDARK=I0(eqVkBT−1)

View chat

4:12 | **equivalent circuit** - ramcy

the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open circuit voltage gets involved here in any way? also why is the source connected in parallel with the diode? thank you

View chat

5:22 | **solar cell operation** - suprabhath

sir, very nice lectures, well edited and structured. Density and current are directly related with each other for a given area. Then, why we switched into JV curve instead of IV curve for further explain?. Thank you

View chat

5:49 | **False use of symbol for batterysupply** - KapEastwoodNL

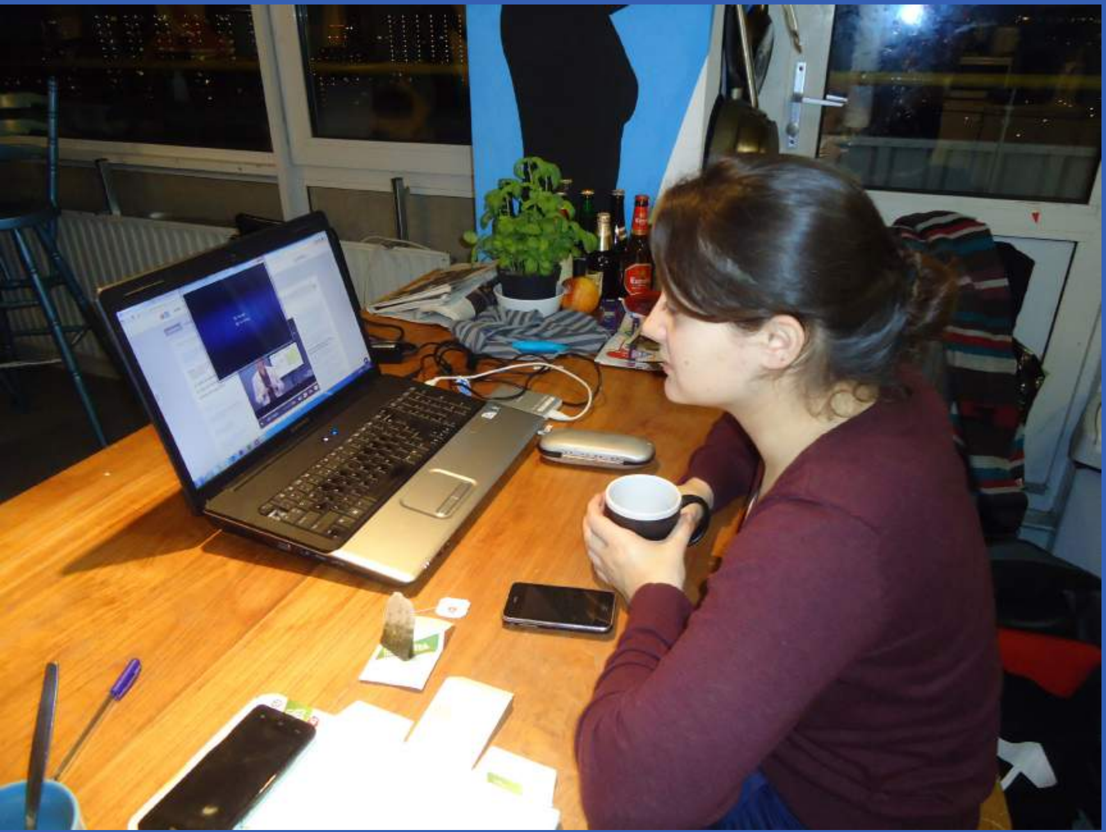
On slide 6 of this course item (reversed biasing) the long side of the battery symbol, indicating the + pole of the power suppy is on the left side as is on slide 6 which is for forward biasing. The + and - on top of the slides are here correct. In week 2 for the reversed biasing both baterysymbol as well as the + and - on the top were placed wrong !

View chat

6:47 | **Graphics interpretation problem** - odiseo

the video is great.am i right in finally saying that,since the light forms the source here which causes the increase in minority charge carrier concentration,which in turn causes a high reverse saturation current to flow,a current source with reverse direction had been set. does the concept of short circuit current and open

# EVALUATION



**STUDENTS DO FEEL MORE INVOLVED WHEN FOLLOWING AN ONLINE COURSE.**

# FOR EDX

# FEEDBACK

**FEEDBACK**

**LESS DROPOUTS**

**FEEDBACK**

**LESS DROPOUTS**

**POSITIVE ATTITUDE**

# THANK YOU