Module-03

Lecture-15

Hi. So, what we have seen is lithography and the introduction to lithography is where we have looked looked at mask and photo resist. Right? Now, the role of the mask and photo resist we have discussed in the last slide, where we have seen that there are two types of photo resist positive and negative. While when you talk about mask, it is a bright film mask and a dark film mask. I also had shown you, how? What is the advantage of using or what happens when you use actually positive photo resist with the bright film mask and negative photo resist with the rifle mask? In the case of positive for this the same pattern that is on the mask will get transferred to the wafer, in the negative photo resist the exactly opposite pattern will come on the wafer.

Now, there is a reason is that because the unexposed area in case of positive photo resist gets stronger, while in case of negative photo resist the unexposed area will get weaker right now. If you take about bright field and dark field, how exactly the mask looks like, right and let us see how the mask looks like and the reason of showing you the lithography in this particular course is that we are developing electronic you know conditioning systems signal. Conditioning systems using operation amplifier but what we are actually, what kind of signals we are conditioning. So the signals that come out from the sensors and the sensors are fabricated using a micro fabrication technology, that's why we are looking at the lithography section. So the the one that I am holding you in for in my hand, this is the bright is a dark field mask. You can see that the patterns are transparent, right, the patterns are transparent. Let me show you the patterns here. So these are the two patterns right and they are transparent, while the the area that his background is dark and that's why this is called dark field mask? this is called dark field mask. Okay? But if I talk about bright field mask, you will you will see that bright field, the pattern is dark and the area is bright the field is bright field is bright and the pattern is dark, right. So, this is the difference between bright field and dark field mask and what will happen? If I use positive photo resist? then the same pattern will get transferred onto the oxidize silicon wafer or whatever the subset is right, if I use negative photo resist the area, which is darker right will get weaker and the area which is brighter will get stronger. In case of positive photo resist the area which is brighter will get weaker, the area which is darker will get stronger or in other terms the area that is not exposed will get stronger in positive photo resist and the area which is exposed will get weaker. In case of positive photo resist, when in case of negative photo resist the area which is not exposed will be weaker and the area which is exposed will be stronger. Okay? So, this is about positive negative photo resist and the mass, this is a 5-inch mass the reason of his in fines mask is you can use a four-inch substrate. Right? A substrate can be oxidized silicon wafer. It can be mica sheet, it can be alumina, it can be glass, it can be any other polymer.

All right so, the substrate general is on the material on which we are going to fabricate the device. All right? Now, the the role of understanding this particular mask and lithography, In this, particular module is that, we want to understand how we can do this design strain gauge and the reason of designing a strain gauge is to understand, how we can see the chain in the tissue properties, when it is a incase of cancer? All right So, like I said that when you do the biopsy, the tissue is taken out and the tissue property changes, as the cancer progresses, what kind of tissue properties? we are looking with the strain gauge? We are looking at their mechanical property that is the elasticity of the tissue. The example that we are talking about here is also that, If you have a strain gauge then you can also measure the force and we took an example of a catheter, right? why we took an example of a catheter and Atrial fibrillation, if you are seen in the last videos that because we we are talking about ECG. so ECG is a heart related, so ECG is used to understand the health of a heart, in terms of beats per minute. Right? the vs the circuit that can be used for amazing bits per minute and when you talk about ECG and heart the problem one of the problem

with the heart is the fibrillation and when you talk about Atrial fibrillation, I already discussed that the heart starts pumping unevenly because of the misfiring of signals and those misfiring of the signals are need to be rectified and the only way of rectification is to burn that area and the one that area we had to go for ablation, when you go for ablation, the surgeon will insert the catheter and will measure the force on the heart. So that force because, it is at the tip of the catheter is also called is also called catheter contact force and to measure that force we need to use a sensor to understand how the sensor is fabricated, we are understand the lithography. Right?

So, that is or the the zest of, why we are to understand lithography. So, let us see in the next module, in the next class, how exactly photolithography process is there, what are the precautions that we need to take, what are the recipes that we need to understand and I'll give you one example of designing a sensor using photolithography. After, which I will teach you, how this strain gauge for catheter contact force can be fabricated. Right? Till then you take care. I'll see you in the next class.