

MITOCW | MITRES_10-001S16_Track15_300k

This week we'll be talking about probably one of the most important aspects of photography, which is light.

As in photo-graphy [spoken phonetically], writing or drawing with light.

It's a very content-rich conversation, we're going to have, and could really, easily, take up a full six-week course.

But for our purposes here, we're going to give you something of an overview, showing you various forms and characteristics of some light sources.

We can't address every conceivable possibility.

But what we can do is tweak your curiosity, I hope, so that you pay attention, very close attention, to what you're seeing as you change your own light sources, looking at the shadows for example.

How do they and they and the highlights change as you move your light source?

And observe exactly what's going on when you make even some very minimal changes.

Let's start with a very simple piece of equipment, a lightbox.

It's really easy to use when you're working with transparent material, just by placing your work directly on top of the lightbox.

But you'll see also, later, it can be also another general source of lighting.

So let's start with a picture of these two petri dishes growing E. coli.

So that works.

In this image, we're seeing small pieces of colored plastic shapes, about 3 millimeters across that are organizing, or self-assembling at the interface between two solutions.

They're becoming a flat assemblage at that interface.

And all I did was put the glass container holding all the material on the lightbox.

And here, I'm making images of sugar crystals growing on sticks.

You know, they serve you that sometimes when you order a cup of coffee.

So here is one rendition on a lightbox of the sugar, and what I decided to do for the next one to simply invert the

image, which we've seen before.

Here's a picture that I made a number of years ago, which I still like.

It's a picture about light, a metaphor about light.

It was one of those lucky efforts when I just set up a magnifier and the paper, [laughs] and in about 30 seconds, I got the picture!

(Very unusual, by the way!) So the image is intended to suggest a process of etching with light when we talked about it in our book *No Small Matter*, about nanoscience.

In this image of something I assume you recognize by now, we see a different kind of lighting that you've seen from previous images of the music box.

I shot from above with mostly daylight, and then I turned on a little bit more light from a Tungsten lamp above.

This is specific to this situation, but you might find it helpful in yours.

Look what happens when you just simply click and turn a light on.

From the light being off, to the light being on, you'll see how the image drastically changes by just adding an additional lamp from above this fishing reel.

Yup [laugh], that's what it is, by the way, it is a fishing reel placed in a translucent, green garbage can.

[laughs] I thought it was fun to see what kind of quality I could get by shooting into a plastic, translucent garbage can.

Very specific to say the least.

Again, just by adding one additional light -- this time, inside the vacuum chamber I'm imaging ' we see what starts as this kind of image, and becomes this image.

You'll see how it really changes with the simple addition of just one light.

In this image of a triangular-shaped water drop -- it's actually an etched area on a surface onto which we placed water ' you can see the reflection of the lamp on the water drop.

We just directed a lamp onto the water.

That's considered direct lighting.

When I shine the lamp onto a card, in this case, a gold card, the light then bounced back onto the water drop and you'll see a completely different quality of lighting.

This is called bounce lighting.

The bounce gives us diffuse lighting.

Let's compare the two.

Let's look at a quick test that I made for us to see the difference between two kinds of bounces.

In this case, the bounce lighting will be used as fill lighting.

We'll use a white card and then we'll fill with a mirror.

The main source of light is daylight from a window.

So, here's an image of the inside of the watch that we've seen before, just with daylight on an overcast day.

Here, I added a white card on the side of the watch for a fill.

Here is a mirror reflecting the daylight, again, as a fill, onto the watch.

Let's go back to the original 'just daylight'; then the card; then the mirror; back to the watch alone; then adding a card; then adding just the mirror.

Let's zoom in to see the subtle differences in each of these cases.

Now depending on what your material is, you might see much more dramatic changes.

But I encourage you to experiment with these ideas.

By the way, here's another image I made, this time using both the card and the mirror as a fill.

Let's see them all together.

Light is all about shadows as well.

And it is quite remarkable how small changes can change the shadow in images.

How a powerful direct light source can produce a significant shadow, and that shadow does, in this image,

become a very strong compositional element.

Here's where I'm using the light on this wafer showing the chip that sits next to it.

In this particular image, I was playing around; I decided to just use a slant of light -- uh, maybe, uh, Emily Dickenson would be happy with that.

On this image, I decided just to make sure the light was covering the entire wafer.

I actually like the first one better, but it's something to think about, about using light in terms of making compositions.

In this image, I'm using a shadow to better communicate what the grading on the surface of this plastic is doing.

It's diffracting the light into different wavelengths.

I produced the shadow by placing a card in front of the light source.

See how the image looks without the card.

Shadows alone can tell a story.

Here, we're trying to show something called the Marangoni effect; you know, when you twirl a glass of wine we see some -- what some people call 'tears of wine'.

It's a complex phenomenon.

In this image, I tried for quite a while to make an image depicting the Marangoni effect.

Not at all successful.

Finally, thinking that I should concentrate on the glass, and the shadow that is being produced, then I finally focused in on what is the Marangoni effect on its own, as a shadow.

Now, for example, looking at this small assemblage, which is about two centimeters across, I lit this with one light.

It's a monopoint, it's somewhat of a fiber optic source.

And you could see carefully, if you look at this image, where does the light source come from, and hopefully you will figure out that if the shadow is here, then the light source has to be around here.

In this next one, I added a second light source that not only lights the device as light to it, but it also adds another

shadow.

And in this next one, the second light source has been altered in terms of its direction and the height because the shadow that it casts is slightly longer and even more so in this final image where the light, the second light source, is very low compared to where it was.

And you know that again because the shadow is considerably longer.

Now, why bother looking at all this?

It really is, once again, learning to see so that when you play with your own light sources with your own devices, you're going to pay not only great attention to lighting of your device, but the shadows that the lighting will be producing.

It's important.

It might not seem that way at this point, but [laughs], I promise you, it really is important.