PROFESSOR: So there's a lot of images in the class, partly because we're studying these materials and you can see just with the ones sitting in front of me, they have this porous, cellular structure. So I show lots of images of materials. We also look at how the images deform under load. And I think, perhaps, that's something that might be a little unexpected.

So for instance, we have a stage in the electron microscope where we can actually deform things in the microscope. And the stage is set up that it has a load cell on it. And we could also measure how much it deforms, the materials. So we can actually watch the materials as they're deforming. So even though the cells may be 100 micron size, you can watch how they deform and how they fail, and you're going to learn a lot about the mechanics from these sorts of observations.

So we have both video of these deformations and also still photography at different time points that we show. Another interesting little video clip that I show in the class is we look at the interactions between biological cells and tissue engineering scaffolds. So for example, people who've looked at trying to heal, say, burns in skin where there's a large area of skin missing, one of the ways that you can do that is by using a collagen-based tissue engineering scaffold.

And when you have a burn in your skin and it just heals the normal way and you get all the scar tissue forming, that scar tissue is thought to form in conjunction with a process of what's called wound contraction. So cells will actually migrate into the wound bed and actually mechanically pull the edges of the wound together, and that partly closes the wound and then scar forms as well. And those two processes are thought to be related to each other. So I've done a collaboration with Professor Ioannis Yannas here at MIT who developed one of these scaffolds for burn patients. And he and I have been interested in this wound contraction problem.

And it turns out if you just put fibroblast skin cells into a dish of culture medium with one of these tissue engineering scaffolds, they will contract the scaffold. And you

can use an optical microscope to actually watch the cells do this. So you can focus on an individual cell and you can see the cell elongating. You can see the scaffold itself contracting. And you can see this whole process.

So this is one of the little video clips that we show in class. And the students always find that fascinating.