Course material

Course:

Micro and Nanofabrication (MEMS)

Video:

4.7 Clip Mask aligner Lithography

Concepts (extracted from automatically generated subtitles):

Surface of the silicon wafers. Resist layer. Robotic arm. Programmed set point pressure. Optical microscopy. Principles of uv exposure. Illumination block. High aspect ratio features. Contact mask exposure. Optics. Wafer. Scanning electron microscope. Modulation of reflection. Uv lamp. Masks.

to video sequence search
(within Micro and Nanofabrication (MEMS).)

to video

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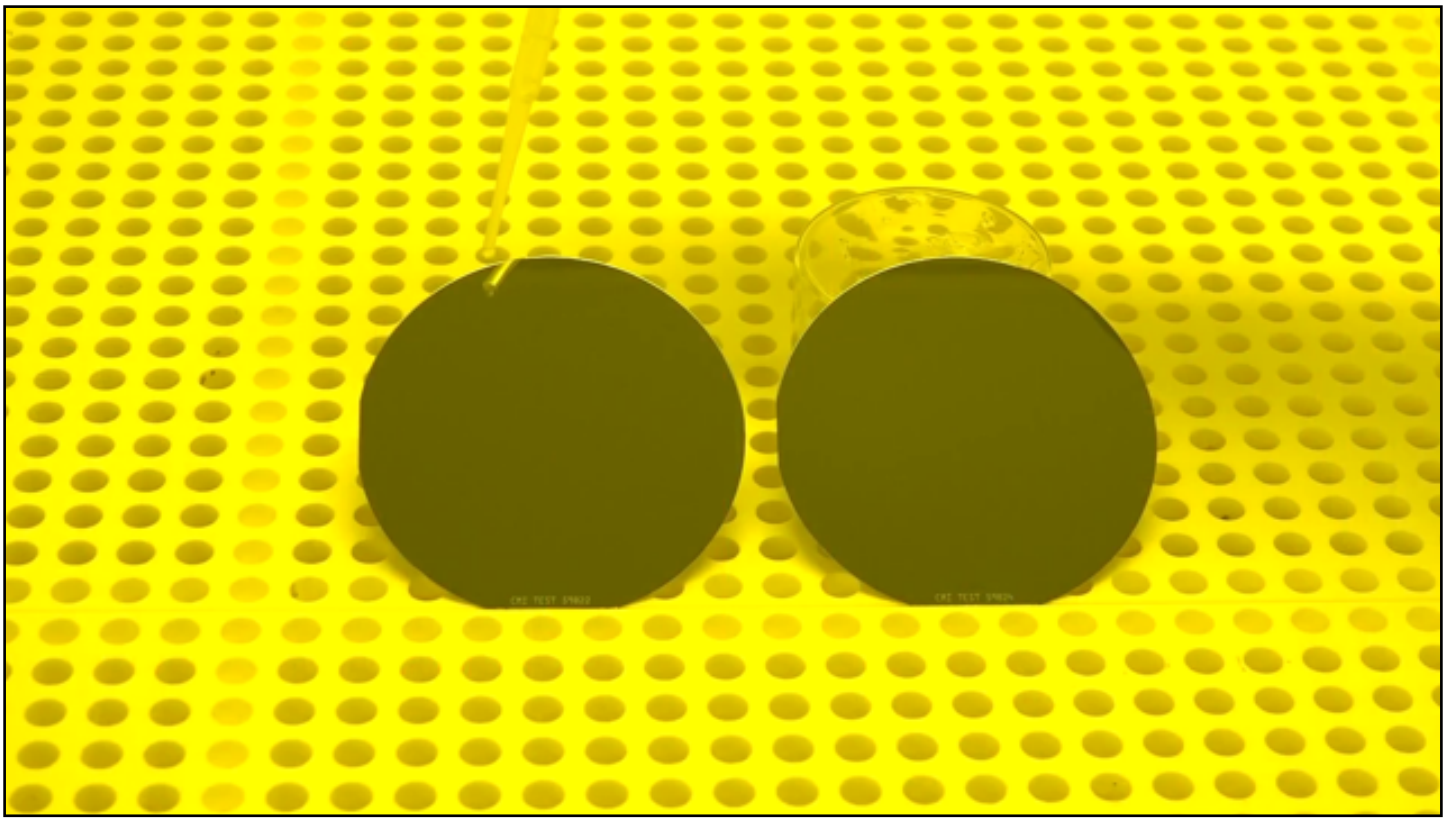
notes

summary

0m 0s

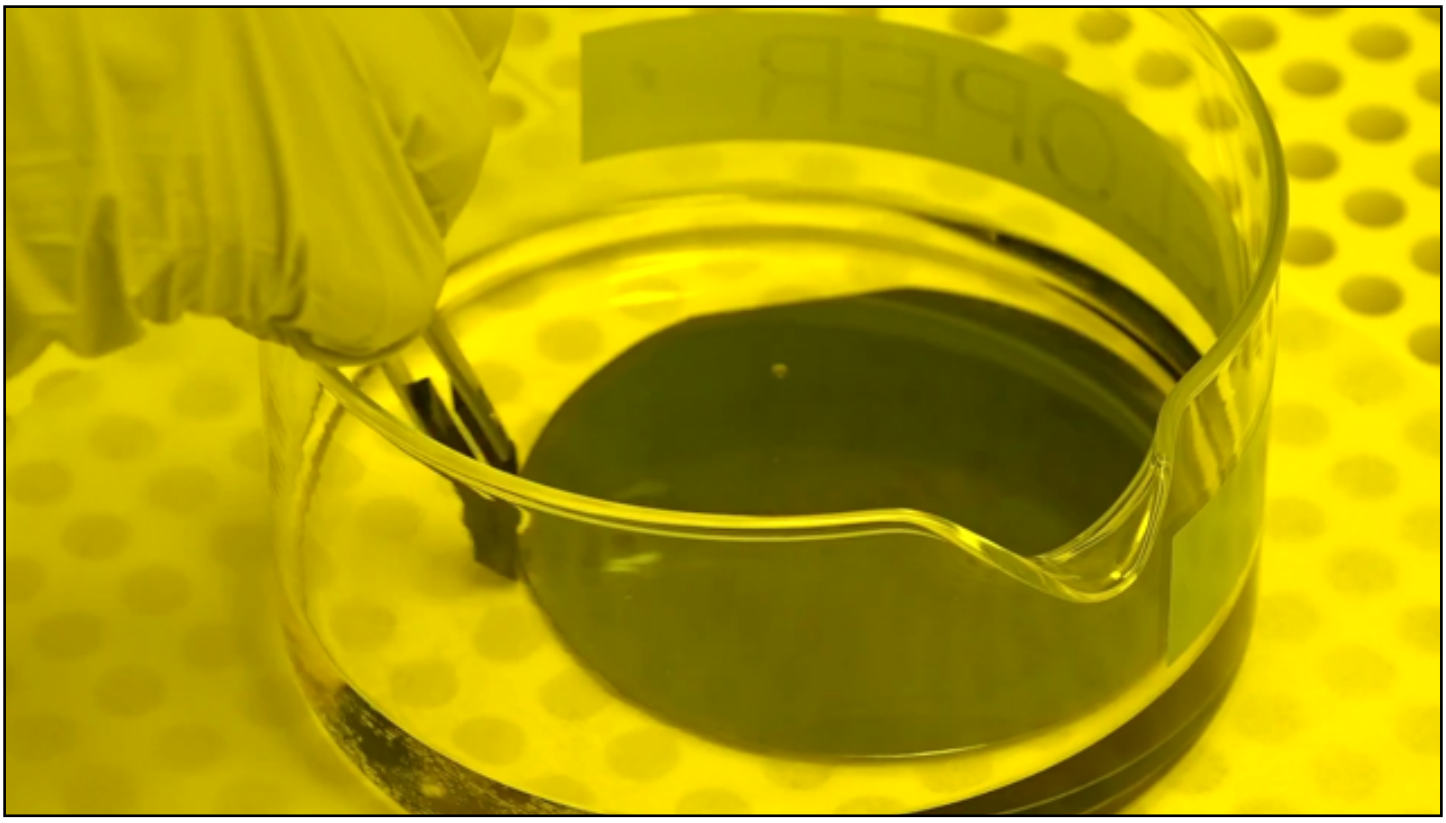


Now that we have seen the principles of UV exposure through masks, lets go to our clean room and follow this process in practice.

notes

summary

0m 1s



First, the surface of the silicon wafers must be cleaned and treated with HMDS. This step removes residual water from the surface and promotes the adhesion of the photoresist. This is especially important for small or high aspect ratio features. The wafer on the left side is untreated with HMDS and is rather hydrophilic. The wafer on the right side was treated with HMDS and as expected, the water drips off immediately without wetting. After surface preparation, an automatic coater tool is used to spin the resist layer on the wafer. The robotic arm first dispenses the resist at low spinning speed. Once the arm moves out the speed is increased and we can see a periodic evolution of colors on the wafer surface. As the resist is thinned down, a modulation of reflection is obtained due to the interferences formed between the resist and the wafer surface. The resist thickness is not uniform across the wafer and becomes thicker towards the edges. In order to avoid contamination during contact mask exposure, solvent is sprayed on the wafer edge to remove the resist in this region. This is called edge bead removal. Now that the wafers are ready we can start the actual exposure on the mask aligner. Here you see that our mask is already in place and we load the wafer into the tool by means of a vacuum chuck. The wafer is now slowly brought into contact with the mask. Once the programmed set point pressure is reached, the illumination block with a UV lamp and optics moves forward. Notice the short blue flash of about 3 seconds. This is how long it takes to expose the resist layer. We now develop the exposed resist in a process similar to what was shown in the mask making process. Although here it is performed manually

notes

summary

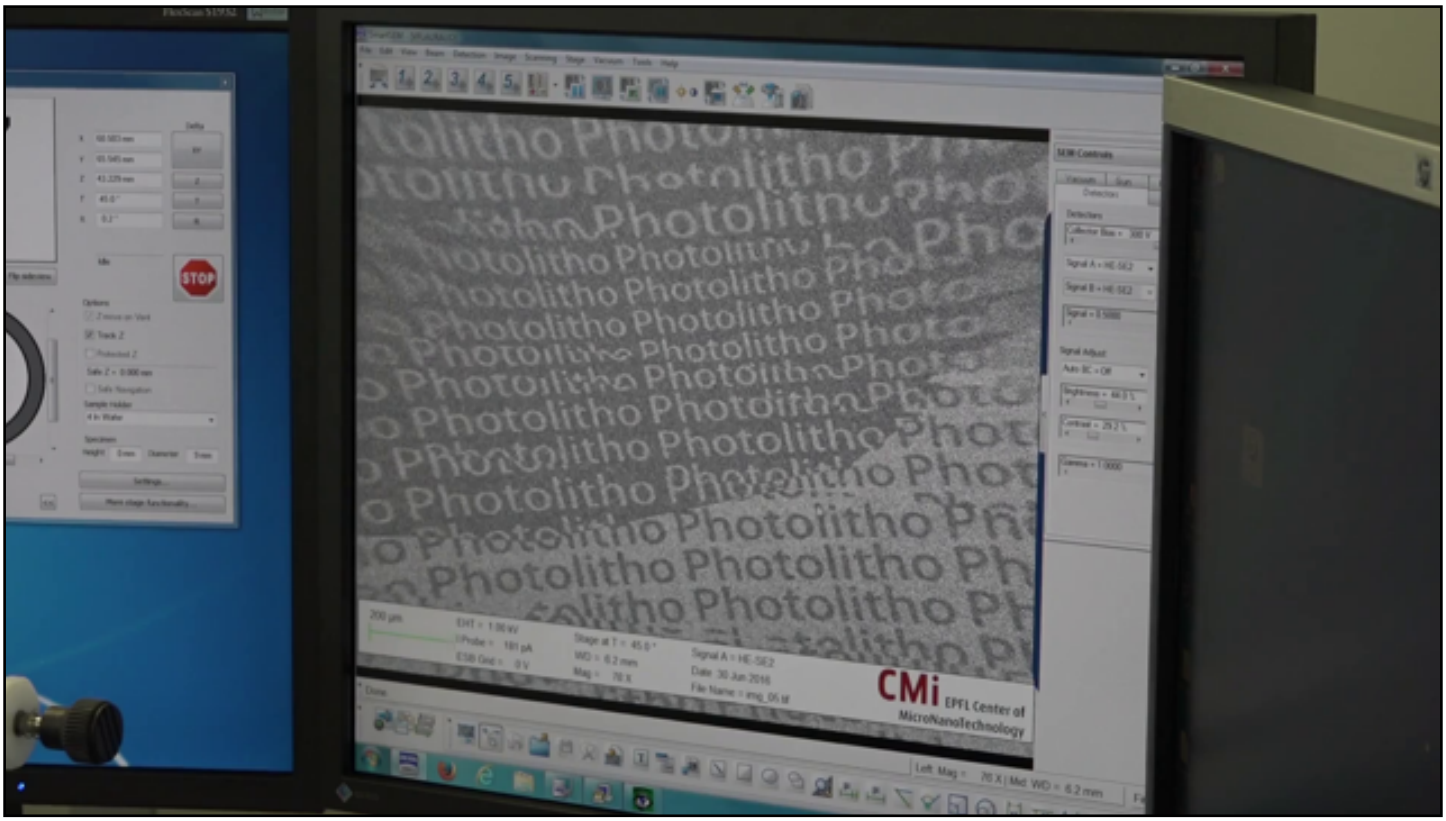
0m 11s

you can also see how the patterned photolitho text appears. After rinsing the wafer in DI water it is dried and ready for inspection. By optical microscopy we check the quality of the process across the entire wafer surface. To check high resolution features of the exposed resist

notes

summary

2m 25s



such as sidewall profiles we use a scanning electron microscope.

notes

summary

2m 49s