Course material

Course:

Micro and Nanofabrication (MEMS)

Video:

4.5 Clip Mask fabrication

Concepts (extracted from automatically generated subtitles):

Mask fabrication. Automatic development tool. Typical writing time. Mask plank. Commercial soda lime plate. Final design check. Cassette of the laser writer. Cycles of development. Different steps. Concentric rings. Raster scan. Clean room. Wafer rotation. Selected portions of the mask. Development sequence.

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 theory on mask fabrication, let's go to our clean room to see how this is done in practice. We will start with a commercial soda lime plate that is coated with chromium and photoresist and we will see the different steps required to make a mask that we will then use for the UV lithography. Here you see the engineer taking out a mask plank

notes

summary

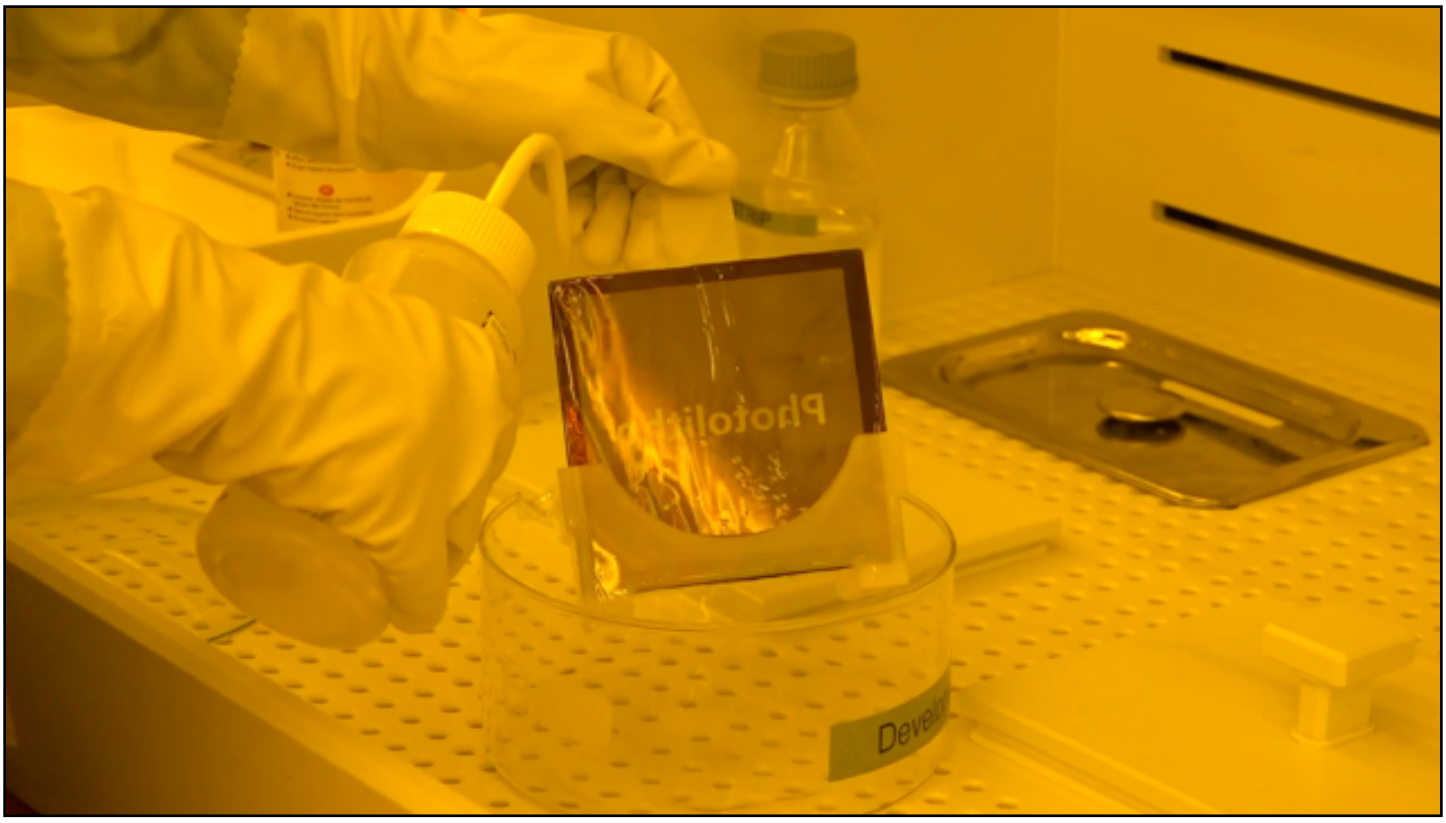
0m 1s

from the black storage box where it was kept during the transport outside the yellow light zones. The user then loads the mask into the cassette of the laser writer. Now that the mask is inside the tool, we perform

notes

summary

0m 25s

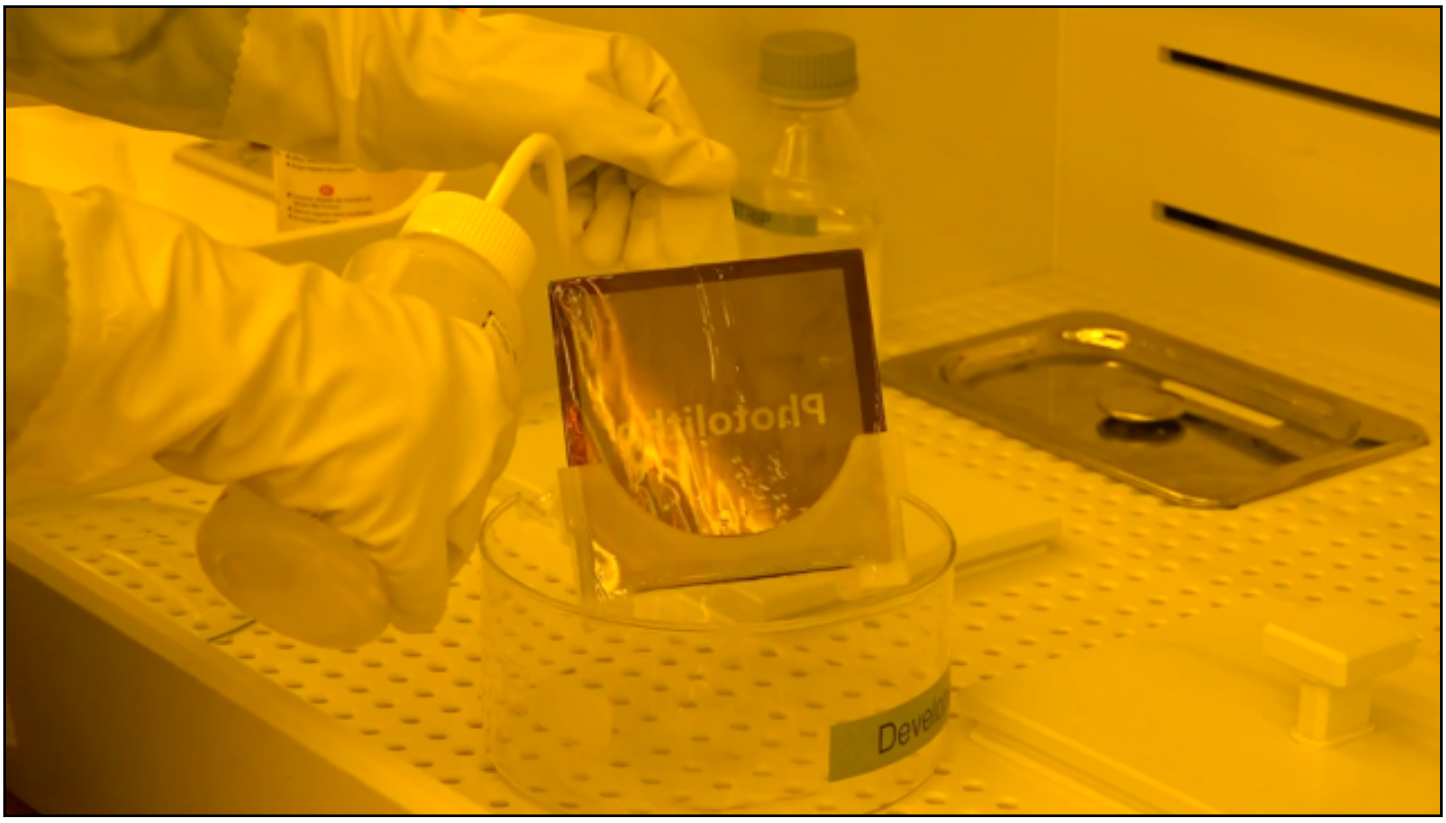


a final design check and upload the data with the appropriate settings to the laser writer. The mask plank is now loaded from the cassette into the stage. The laser then begins to raster scan across the mask in order to write the pattern that was previously created on the CAT system. As the writing progresses you can see the mask coming forward towards the camera. A typical writing time for a 5 inch mask can vary from 5 minutes to a couple of hours depending on the pattern density and complexity. After exposing the resist with the laser, the mask plank is processed by a developer to reveal the resist pattern. Here the user loads the mask into an automatic development tool that applies several programmed cycles of development, rinsing and drying. Once the development sequence is initiated, 2 nozzles successively come into action. The first one that you see coming from the left is applying deionized water and is used to first clean the mask from possible dust particles. Then a second nozzle coming from the right dispenses the developer. By alternating such cycles and managing the wafer rotation, efficient renewal of the developer at the resist surface is ensured in order to remove uniformly the exposed resist. You can now see the wafer rotating at very high speeds; up to 5000 rpm in order to remove all liquid. Observe the concentric rings that appear and fade out as the DI water is dried off. Before etching the chrome, we perform a check using an optical microscope to verify that the resist is correctly developed. Notice that the mask design was mirrored to take into account that we will use it upside down when exposing the wafer in the UV lithography step. Having confirmed that the development was done properly, the user, who wears appropriate protection gear, dips the developed mask plank into a chromium etch bath for

notes

summary

0m 43s



90 seconds. Here this is sped up. After rinsing you can already see that the selected portions of the mask where the chromium has been etched away become transparent. In one of the last steps we stripped resist that was not exposed. You can in fact see the dark, resist loaded drops of solvent dripping off the mask into the beaker. After final rinsing and drying, the mask is now ready for UV photolithography.

notes

summary