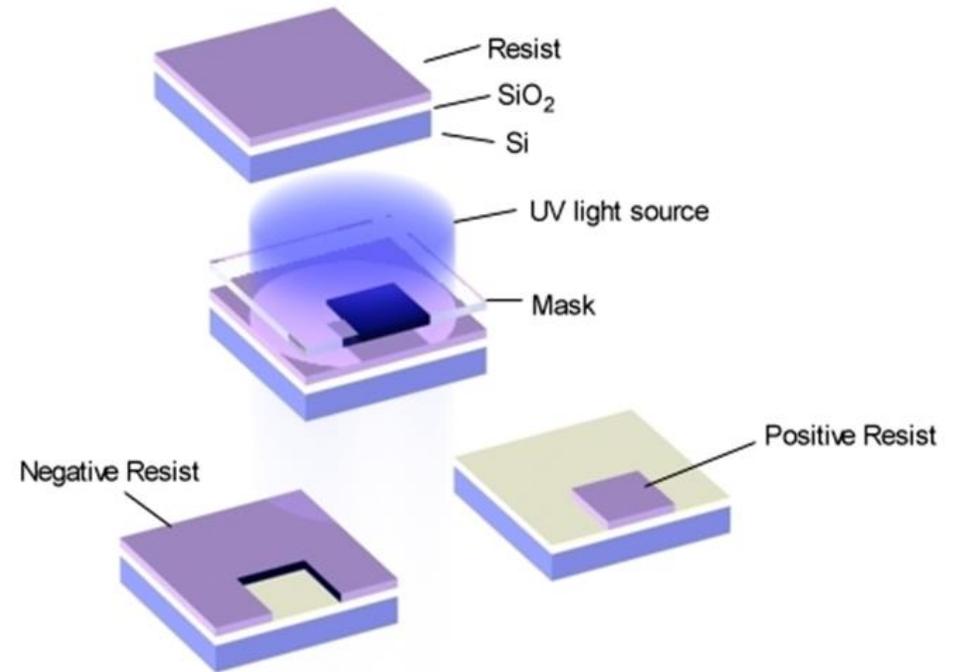


# Lithography Reminder

- Lithography is the process of applying resist to the wafer before patterning it and removing some of the resist in accordance with that pattern
- Photolithography is the method used in this class, where UV light is exposed through a photomask in a Mask Aligner.
- The Mask Aligner allows us to put the Photomask and wafer in near contact before examining certain area called “Alignment Marks” with microscopes
  - We can then move the wafer while they are in near-contact to line up the matching alignment marks with each other before initializing contact and exposing

# Different Types of Lithography

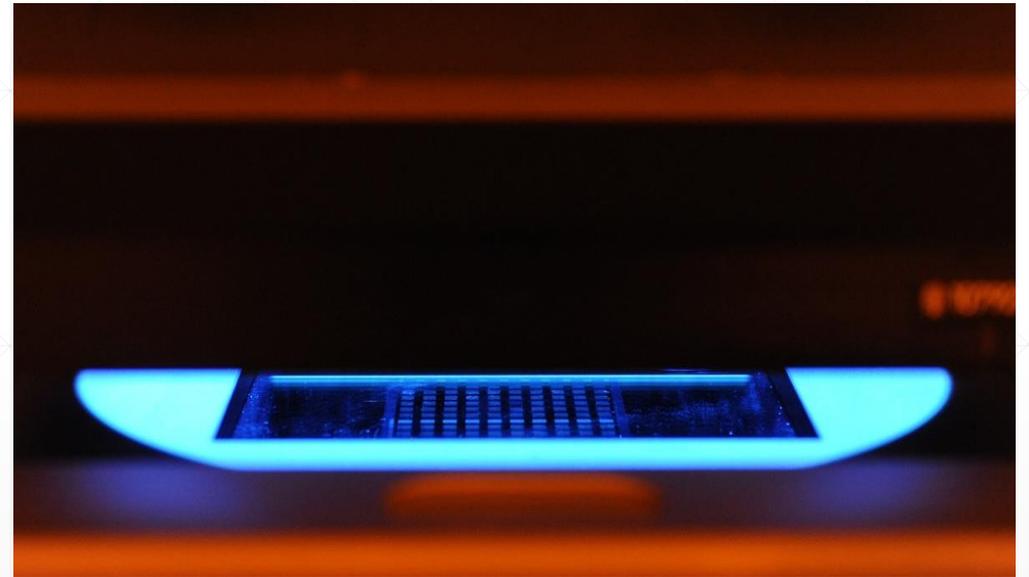
- Positive resist is removed when it encounters UV light
- Negative resist stays when it is hit with UV light
- If both resists are used with the same mask they will produce photo-negative results



# How Lithography Works

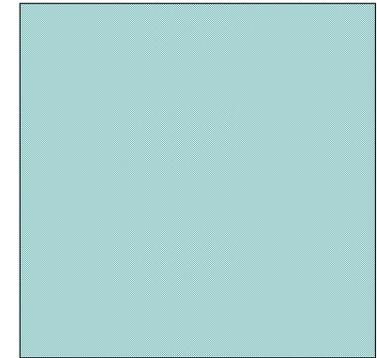
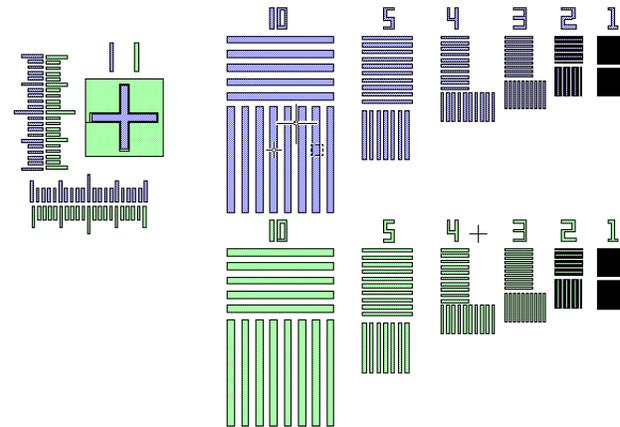
## Negative Resist   Positive Resist

- Photoresist crosslinks when hit with UV light
- Exposed resist becomes very difficult to remove once it undergoes high temperatures
- Photoresist becomes developer soluble with hit with UV light
- Otherwise the resist remains developer resistant until it is hit with UV light

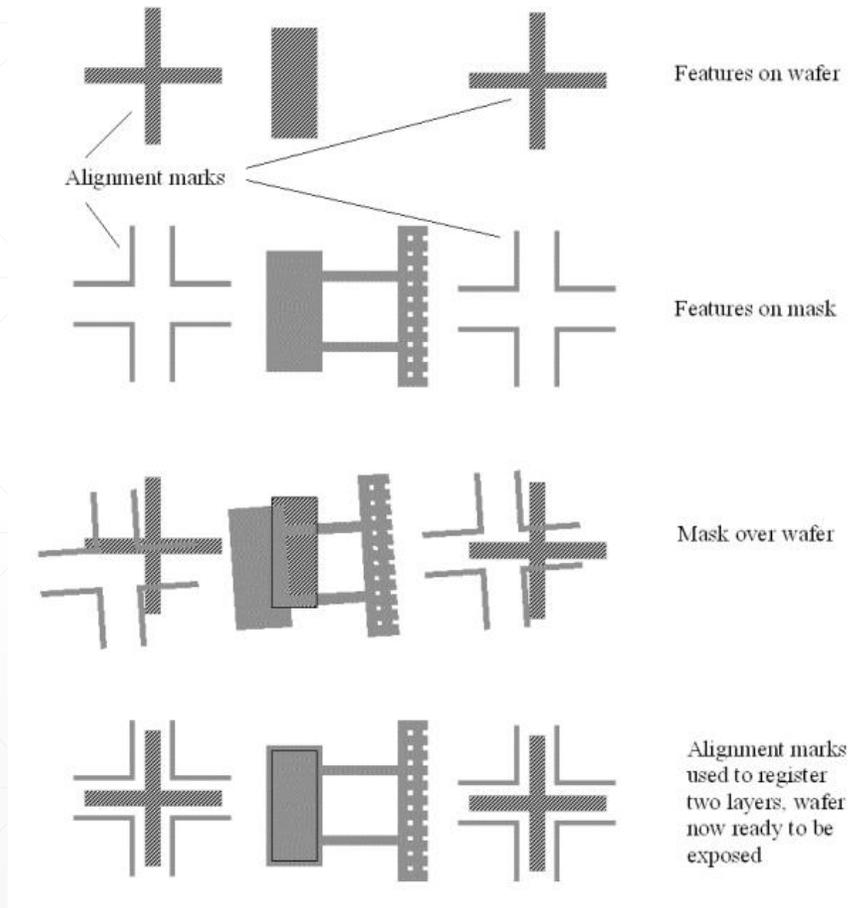


# What are Alignment Marks

- Alignment marks are placed outside of any important features on either side of a wafer
- Each layer you apply on the surface will have a set of alignment marks for you to use to align to the previous step
- Some alignment marks can also include other useful features
  - Large windows to make it easier to find
  - Feature size markers to verify the quality of exposure



# How are Alignment Marks Used



- Two separate cameras are used to display the right and left microscope cameras on the same screen
- This allows us to perform simultaneous alignment and can avoid jumping back and forth
- We can reasonably assume that if the far left and right features are aligned properly with the wafer that all the features between will also be properly aligned.
- If we are misaligned, we will have to remove the resist and try again or all the features may not connect where they should

# Lab Assignment #3

- Question 1: Can you draw an approximation of the alignment marks you used for this process?
- Question 2: At what temperature and for what duration did you perform your soft bake?
- Question 3: What is the purpose of a hard bake performed at the end of this lab?