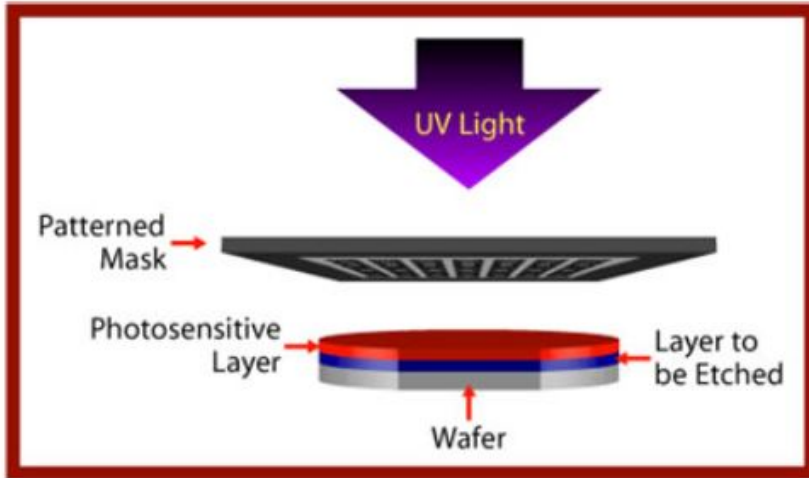


Mask Alignment

The expose process consists of the align and expose steps.

Alignment is one of the most critical steps in the entire microsystems fabrication process. Due to the microscopic size of these devices, a misalignment of one micrometer (micron or 1m) or even smaller can destroy the entire device and all the other devices on the wafer. It is important that each layer is aligned properly and within specifications to the previous layers and subsequent layers.



The patterned mask (or reticle) is a quartz or glass plate with the desired pattern (usually in chrome).

The picture shows a mask used to expose an entire wafer. Notice that there is a repeating pattern throughout the mask.

Each of these patterns is a die containing few micro-sized components.

Some equipment do not use masks. Instead a smaller quartz plate is used with just a few die (inset).

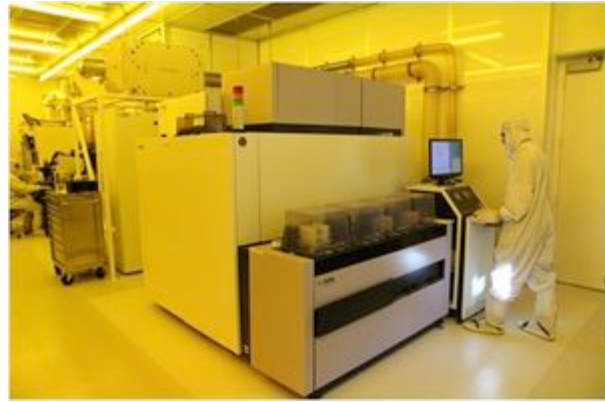
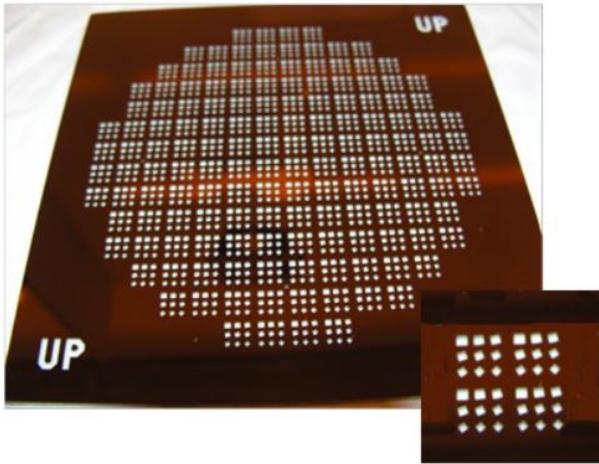
Regardless of which is used, a mask or a reticle, the plate is locked into the expose equipment.

The wafer is aligned to the mask or reticle along the x and y coordinates.

The z-coordinate is adjusted to define the focal plane of the image.

When a mask is used, a single pulse of light will expose the entire wafer. When a reticle is used, the wafer or the reticle is "stepped" in the x, then y directions, exposing a small portion of the wafer with each step.

This type of expose equipment is called a "stepper" or mask aligner.



Why mask alignment is important?

1. Alignment is one of the most critical steps in the entire microsystems fabrication process.
2. Due to the microscopic size of these devices, a misalignment of one micrometer (micron or $1\mu\text{m}$) or even smaller can destroy the entire device and all the other devices on the wafer.
3. It is important that each layer is aligned properly and within specifications to the previous layers and subsequent layers.