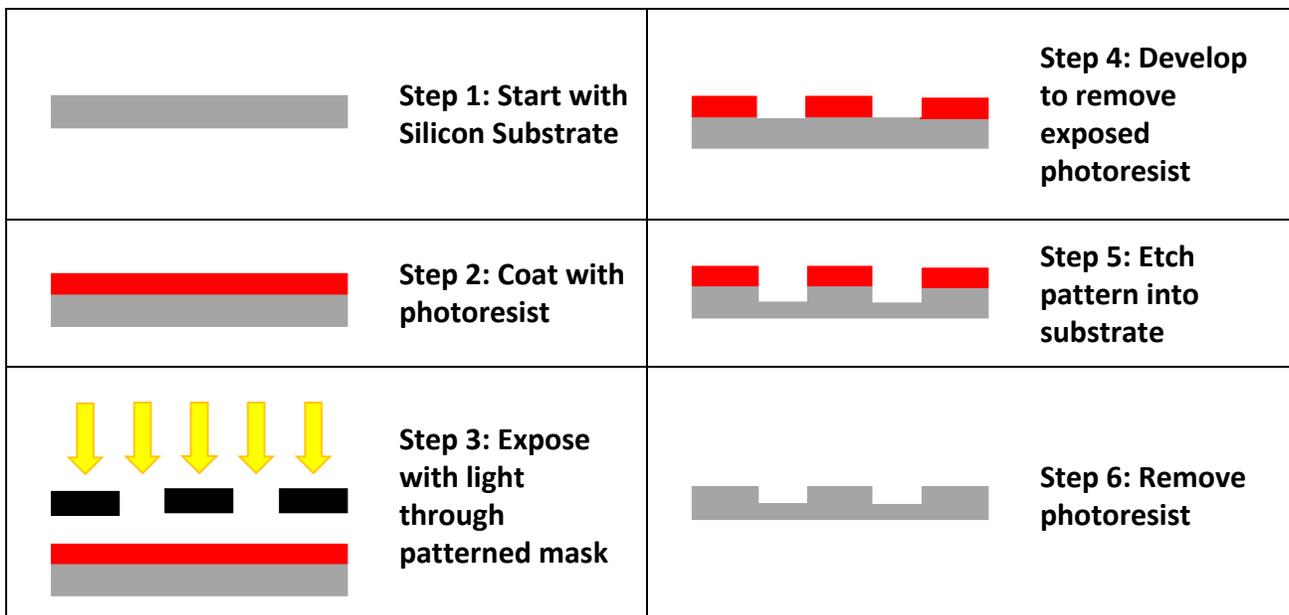


Microelectronic Engineering: Sunprint Photolithography

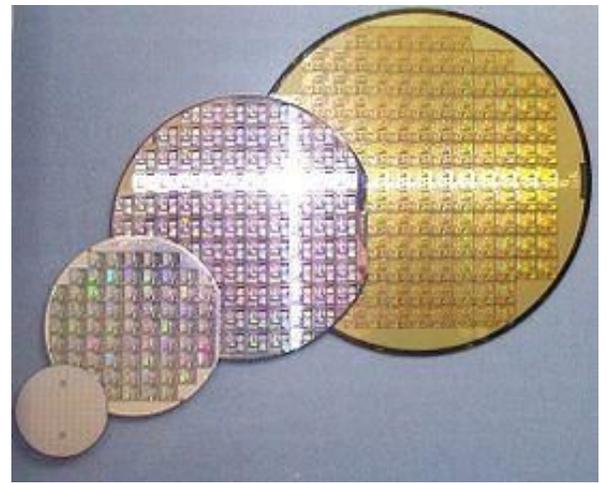
This Activity: In the Sunprint activity you just did, the Sunprint paper represents the substrate coated with photoresist (Step 2). The transparency with the design on it represents the mask, which you place over the substrate to determine where your design will be printed. Then it's exposed with light – not sunlight like the Sunprint paper, but a special wavelength of light that's barely visible to the human eye (Step 3)! In the area where the dark parts of the mask were not covering the substrate, the photoresist was chemically altered so that it can be removed easily – the same thing happened with the Sunprint paper, and that's why it changed color when it was exposed to sunlight. Next, the substrate is developed – your Sunprint was developed in water. Photoresist is developed in other chemicals. The development of your Sunprint changed the colors to reveal your design, just as the development of the photoresist removes areas of the photoresist to reveal the design (Step 4). Additionally, the areas where the photoresist was removed is etched away in another chemical process, leaving the design printed on the layer below (Step 5). Then, the photoresist is removed, and the process is repeated several times with different layers of films and different patterns to create all kinds of interesting circuits (Step 6)!



Applications: Photolithography is the backbone of the semiconductor industry. To make smaller and smaller devices, the required masks must also be minimized, as well as the optics and chemistry for accurately recreating these patterns onto the surface of the wafers. These micro devices are used in leading edge technologies, medical devices, and smart phones. Finally, photolithography is used to create the patterns necessary to make circuits, which power smartphones, computers, some medical implants and other emerging smart devices.



Silicon Wafers Before Processing



Silicon Wafers After Processing

Further Information: Follow any of the links below if you want to learn more about Microelectronic Engineering and photolithography!

- BYU Interactive Lithography Tutorial:
<http://cleanroom.byu.edu/Lithography>
- Microelectronics Fact Monster:
<https://www.factmonster.com/dk/encyclopedia/science/microelectronics>