

Name _____ period _____

Nanosmores Lab

Objective: Create an edible layer cookie (smore) that represents the process used to make a patterned silicon wafer using a substrate & a photoresist

Background:

Photolithography is one process through which very small (less than a few micrometers) 3-D features can be produced. It is the basis for manufacturing microelectronic chips used, for example, in computers. The lithography process involves a series of steps that builds up successive layers of materials. The top layer is exposed to radiation using a **mask**, which contains a pattern that is transferred to the top layer. The process begins with a **substrate**. Silicon is the preferred material. A primer is applied that acts to help bind the next layer, the photoresist, to the substrate. The **primer** is applied, and then the photoresist is layered on afterward, building up on the substrate layer in a sandwich like fashion. The **photoresist** is a chemical that is sensitive to radiation (e.g. light) and whose properties (*i.e.* solubility) are changed when exposed to radiation. The **mask** contains opaque (block radiation) and clear areas (allow transmission of radiation), which allows the radiation to pass through only selected areas to create the desired pattern.

Parts of the silicon wafer:

You need a material to act as a base for your lithography wafer. This is called the substrate. Then there is a primer layer that connects the substrate to the top part of the wafer. The photoresist is the next layer. This layer will be affected by either heat or light. The resist is covered by the mask, which has a pattern of holes. After the wafer is treated the mask is removed & the pattern created will be revealed

Materials:

Marshmallows
Hershey's chocolate bars
Graham crackers
Teflon template
Heat gun

Procedure:

1. Cover your lab area with a sheet of aluminum foil
2. Layer your smores on the foil in the following order

Bottom=marshmallow
Next =chocolate
Next=marshmallow
Top=Teflon plate with holes

3. Using the heat gun, carefully heat the wafer until it looks tasty
4. Before you eat it, answer the following questions

Questions:

1. Which part of your nanosmore is the
 - a. Substrate
 - b. Primer
 - c. Mask
 - d. Photoresist

2. What is the purpose of the mask?

3. Label the substrate, photoresist, mask & primer in the diagram

