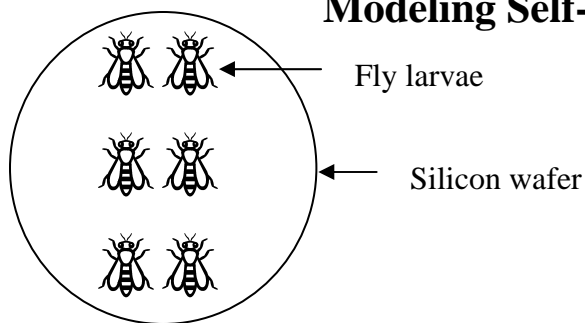


## Student Worksheet or Guide

### Modeling Self-Assembly, Part I: *The Fly Prison*



Your team has been hired by researchers to build a prison for fruit flies so that they can put a tiny transmitter onto each fly. These scientists want to attach a radio transmitter onto the back of the fruit fly. The catch is, you must use self-assembly to stick fruit fly larvae to a wafer, and the flies must be arranged as in the diagram at left:

**Problem: How can our group create a fruit fly prison using only self assembly?**

**Making a stencil:** Before you can rely on self assembly, you will model how scientists create a stencil to put the flies where needed.

1. Why will you use the index card as a base to put everything else on top of? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
2. Completely (but lightly) color the index card with the plain pencil. What does the pencil represent? \_\_\_\_\_
3. Put the card representing the mask on top of the circle representing the wafer. Where would ultraviolet light touch the photoresist? \_\_\_\_\_ Use the white-out to color the area where the light touches.
4. What happens when ultraviolet light touches the photoresist? \_\_\_\_\_  
 \_\_\_\_\_

Remove the mask. If the wafer is placed in developer, what would happen to the photoresist? Would all of it be washed away? Explain which area(s) would b

5. washed away. (Hint: Review the photoresist card.) \_\_\_\_\_  
 \_\_\_\_\_
6. On the area(s) that were washed away, what is exposed? \_\_\_\_\_
7. Add gold to your wafer by using the yellow pencil. Where will the gold be placed? (Hint: Review the card. How is gold put on the wafer?) \_\_\_\_\_  
 \_\_\_\_\_
8. If the wafer is now placed in a solvent, what would happen? Would all of it be washed away? Explain which area(s) would be washed away. (Hint: Review the solvent card.) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
9. What area(s) would remain? \_\_\_\_\_  
 \_\_\_\_\_ Use your eraser to show what the solvent would do to your wafer.

**Checkpoint: Show your progress to your teacher before continuing.**

**Self-Assembly** Write a procedure to the company that describes how to build a fly prison using self-assembly by filling in the chart below. Write down each step in order, and explain why each step is taken. (**Hint:** Look at the remaining cards. Which ones will bond together? Why?)

What will form bonds next?	Why?

**Procedure** Congratulations! You have built a model for how a scientist would test this in a laboratory. Now, write a procedure to the scientist that describes how to build a fly prison by filling in the chart on the next page. Be sure to use the terms that each part of your model represents. The first step has been done for you as an example. Be sure to explain why each step is taken.

Procedure	Why is this step taken?
1. <i>Use the silicon as a base.</i>	<i>Silicon acts like a dinner plate.</i>
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

**On the back of this page, draw a diagram of the final result with each item labeled so that the scientist can follow your instructions.**