ECEn 550 – MEMS
Fabrication Lab
Week 4
"Compliant Mechanisms Part B"

Description

In this lab exercise you will test the polymer based compliant mechanism structures you made in Week 3. These tests will include whether or not individual devices are bistable, and the movement distance of devices between each state.

Major Objectives

1. Bistability. There are a large variety of compliant device sizes and shapes on your wafer (if everything went correctly in Week 3's lab). Changes in the devices include leg width, leg length, leg angle, and total size of the middle slider. It is unlikely all devices will exhibit bistability. Using a probe and the probe station, determine the percentage of bistable devices you have. To do this, push the devices back and forth into their up and down positions using the microprobe on the probe station. Are they stable in these positions? Some devices may need to be pushed up significantly before they will demonstrate bistablility. It will take some practice to be able to do this without breaking the devices by applying too much force. Try to compile your bistability information based on the size of your devices. How does leg length factor in? Can you tell how wide the legs are? If so how does this effect bistability? The individual devices are labeled with Roman Numerals so you can keep track of them.

2. Switch Movement. For those switches that prove to be bistable, determine their total switching distance – the distance they move between their up and down state. You can determine this using the calibrated microscope in the lithography area. Answer questions like which switches move furthest and determine if there are any trends related to device size, leg length, or leg thickness.

3. Other Investigations. Try to take as many pictures as possible for your notebook. Did the through holes intended for etching show up in your devices? Do any of the devices seem to drag along the surface of the substrate? For those devices that failed to work, any ideas why?