**DekTak3 Surface Profiler System**

BioMEMS and Microfluidics Lab

Rutgers University

Conversion Chart: 10 Å = 1 nm

 1000 Å = 100 nm

10,000 Å=1 micron

For Light stylus force on soft films, use low or medium scan speed with as short a scan length as possible.

Stylus Decent rate for “Soft Touch” mode reduces rate of descent and stylus force to minimize stylus impact on substrate.

The stage is operating at level when the slope of the line is less than 10 mdegrees. You will need to verify the levelness of the stage before each use.

Every tick mark is = ~16 to 17 milli degrees.

**Operating Procedure**

1. Turn on Power to profiler first. Turn on computer and monitor if its off. Turning on the profiler first negates the error that pops up if the computer is turned on first.
	1. If the machine doesn’t turn on, turn off the switch, make sure it is plugged in and turn back on.
		1. If the machine still doesn’t turn on ask one of the senior grad students for assistance

2. The profiler program will start up and ask you to check the video source. Click ok, and ok on the next screen. You shouldn’t have to change any of the settings.

3. To level the stage before using:

 Place the Silicon oxide wafer labeled “For leveling stage” on the stage. Run a scan program for 5000um, hills and valleys profile, +/-650 A, medium speed, medium resolution, Force=30.

 Once the scan has run once, wait for the stylus to ascend back to rest position. Click Analysis→ Slope→ Calculate. The slope will be displayed in the command box. Adjust the levelness positive (clockwise) or negative (counterclockwise) depending on the slope of the line you just calculated. You need to be within 10 mdegrees of 0 to be considered level.

 Remove the silicon oxide wafer and replace it back into the dish on top of the profiler.

4.Place substrate on the stage. DO NOT turn the lowest wheel. That controls the level of the stage, and it needs to stay to within $\pm $0.01 degrees of level. If the stage is not level, the readings will be inaccurate. Ask one of the grad students for help if you think the stage needs to leveled out. **DO NOT LEVEL THE STAGE WHILE THE STYLUS IS IN MOTION!!!!** Use the stage adjustment knob to slide the stage out towards you, place your substrate on it and then use the stage adjustment knob to slide the stage back under the stylus.

 - The stylus moves from front to back so place your sample as centered as possible and in the direction you want to measure.

 - You can adjust the x-y rotation of the stage by using the wheel closest to the stage. The x-y directional adjustment is done with the joystick on the front of the profiler. The directions are marked.

If the stylus tower doesn’t seem to be lowering, press escape and run the scan again.

**DO NOT TOUCH THE STYLUS! EVER!**

**When you perform a scan, start at the top of the highest feature and measure the drop to the bottom of the substrate rather than trying to measure the height from base to top. If the stylus hits a large feature, it may break or become unaligned or otherwise damage the profilometer.**

To do a simple single scan:

1. Click on Scan Program. Adjust scan length (1-5000 um) depending on how long you want the scan to be.

2. Set scan resolution by adjusting speed: Low , Med, High.

 Lower speed gives higher resolution when combined with Low number of data points.

Generally a Medium speed with low resolution will give decently accurate data points.

The force can be changed from 0-50mg, but we have been keeping it at 30 mg for measuring parylene deposition. If you are trying to measure the thickness of a soft film like Shipley or PDMS, use the “Soft Touch” mode (lower left corner). This slows the rate of descent of the stylus and reduces the force between the stylus and the substrate

3. After all settings are corrected, click on run single scan from the pulldown menu “Run”. The profiler will begin running the scan.

The stylus will descend until it touches the substrate surface. You will see the stylus and its reflection on the monitor. The stylus is the dark shape coming down from the top of the screen and the reflection will be lighter in color, and come up from the bottom of the screen.

As the scan progresses, a white line will appear on the plot. It will run up to the set length of the scan.

After the scan is finished, the words “Homing….” Will appear across the bottom of the monitor. **Do NOT do anything until those words disappear.**

4. If you want to level out the plot (and it usually appears with some sort of slope), position the R bar with the left-right arrows to where you want to start. Place the M bar on the same plane as the R bar, and click on “Plots” then “Level” plot. This will level out your plot and make it easier to take step height measurements.

If the stage is not level to within 0.01$°$, the readings will not be accurate. Ask a grad student for assistance in leveling the stage if the plot line does not appear to be level after doing step 3.

At the end of the scan, raise the stylus to the up position (stylus position-> stylus up) to prevent accidental touching of the stylus from the substrate or your body.

To take your step height:

1. Place the R bar at the base of the step

2. Place the M bar at the height you wish to measure-if you had a place where the film you are measuring rippled, bulged or ripped, take the step height after that so you get even measurements.

3. The change in elevation will be displayed in the middle of the monitor as the value for Vert-D (vertical distance).



After the trace has completed, the message “Homing stage to ready position” will appear on the bottom of the screen and the trace will change.

It will look like the picture below:

