

## AlphaStep 500 Stylus Profilometer

You may use the profilometer after receiving training from the facility staff. Reservations may be made in FOM, but are not necessary. Log on and off upon start and finish of use; the monitor power is interlocked to FOM.

The AlphaStep profilometer can provide angstrom resolution in the vertical dimension for measurement of step edges, pits, bumps, etc. The stylus travels from left to right. To avoid peeling a film, it may be easier to travel down a step edge rather than up (i.e. align the sample with the film on the left). The sharper the step edge, the easier it will be to measure height.

### Procedure for use:

- 1) Turn on the computer and follow instructions on screen (ESC to boot, ENTER TO INITIALIZE).
- 2) If desired, let the system warm up for 5-10 minutes. Steps 3-5 can be performed during this time.
- 3) Place sample on the stage.
- 4) For maximum precision, close the Plexiglas cover to reduce air currents around the stylus.
- 5) Use stage positioning knobs on left of instrument to situate the sample beneath the stylus.
- 6) Press F5 to activate the camera view.
- 7) Press and hold the DOWN ARROW to activate the stylus and then raise the stage. Adjust the lateral stage position to keep the light spot near your desired scan region. Release the DOWN ARROW when the stylus contacts the substrate.
- 8) If necessary, press the UP ARROW to withdraw the stylus, then re-position the sample, and press the DOWN ARROW again to re-engage the stylus. Note that the stylus contacts the surface at the same X-Y location (relative to the camera/monitor) every time.
- 9) You may change the scan parameters by pressing ESC and selecting RECIPE, VIEW/MODIFY
  - a. **Scan Length.** Default is 500 microns. Range is 1 micron to 5 mm. Substrate curvature will be more likely to convolute the measured data for longer scan lengths.
  - b. **Vertical Range/Resolution.** Default is 13 micron/1 angstrom. Can select 300 micron/25 angstrom if the data goes off scale due to sample tilt.
  - c. Press ESC once parameters are set. (Changes are kept in temporary memory and do not need to be saved.)
- 10) Press F8 (START) to begin the scan. Avoid bumping the table while the scan is in progress.
- 11) When the scan is complete, the stylus will return to the start position and the scan data will be displayed.

Analyzing the scan data:

  - a. It is usually necessary to level the data.
    - i. Press F10 (LEVEL) and left/right leveling cursor lines (purple) will appear.
    - ii. Use trackball or left/right arrow keys to move the active leveling cursor.
    - iii. Press the trackball button or space bar to toggle between the left/right leveling cursors.
    - iv. Place left/right cursors on the same flat plane and press F10/LEVEL to level the data relative to those two cursor points.
  - b. Vertical and horizontal positions are measured by the blue measurement cursors. These can be manipulated as in steps ii and iii above. The table to the left of the plot will indicate the horizontal and vertical positions of each cursor, and the difference between them, allowing for measurements of heights and distances.
- 12) If desired, press PRINTSCREEN to send the data screen to the printer.
- 13) When finished:
  - a. Press F5 to activate the camera and press the UP ARROW to lower the stage.
  - b. Move the sample stage toward you and remove your sample.
  - c. Press ESC to return to the menu and select EXIT, SHUTDOWN, y (i.e. 'Yes' to confirm shutdown).
  - d. Physically turn off the computer by pressing the power button.
  - e. Clean up the work area.
  - f. Log off of the instrument in FOM.

Exporting data to 3.5" floppy disk (Not all disks work, older high density or double high density disks may work better. Sometimes only one file can export, so double check)

- 1) After taking a scan, press F4 to save raw+summary data to database. Save as a filename with no "#" or other symbols. You may need to save a recipe name also.
- 2) To export data from database:
  - a. Press ESC and go to DATA menu,
  - b. go to CATALOG
  - c. Press F2 to recall, find your file name, highlight and press F3 to export
  - d. Select N to export as ASCII
  - e. Write down the scan lengths as that information might be hard to see later
  - f. Take other data if needed
- 3) When done, exit to DOS instead of just shutting down.
- 4) Data is saved to the c:/tencor/exp/sdata directory
  - a. Type "cd exp", enter
  - b. Type "cd sdata", enter
  - c. Type "dir" to see all files in the directory
- 5) Insert disk and type copy [filename.rwt] a: "copy scan.rwt a:"
- 6) Import into excel
  - a. First two columns may be summary data, in Angstroms
  - b. All data are in the other columns, but there are 16 columns of that data.
  - c. You probably need to create your own x-axis scale to plot to scale using known scan lengths