CONTACT ANGLE MEASUREMENT

THETA LITE GONIOMETER v 3.0

UNIVERSITY OF LOUISVILLE
Micro/Nano Technology Center

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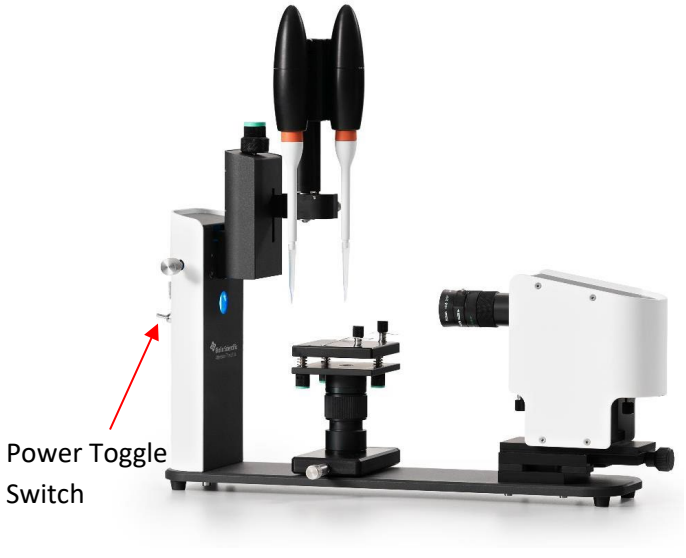
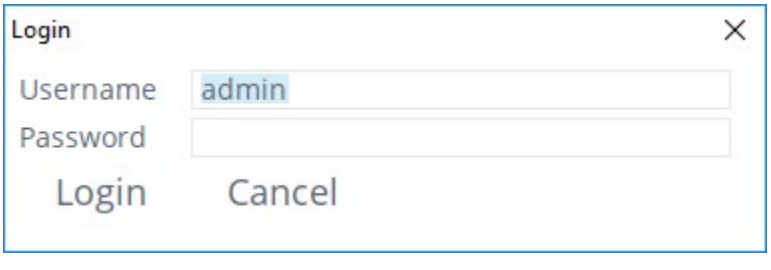
Revised May 29, 2025 Michael Martin

SOP for BioliSn Scientific Attention Theta Lite

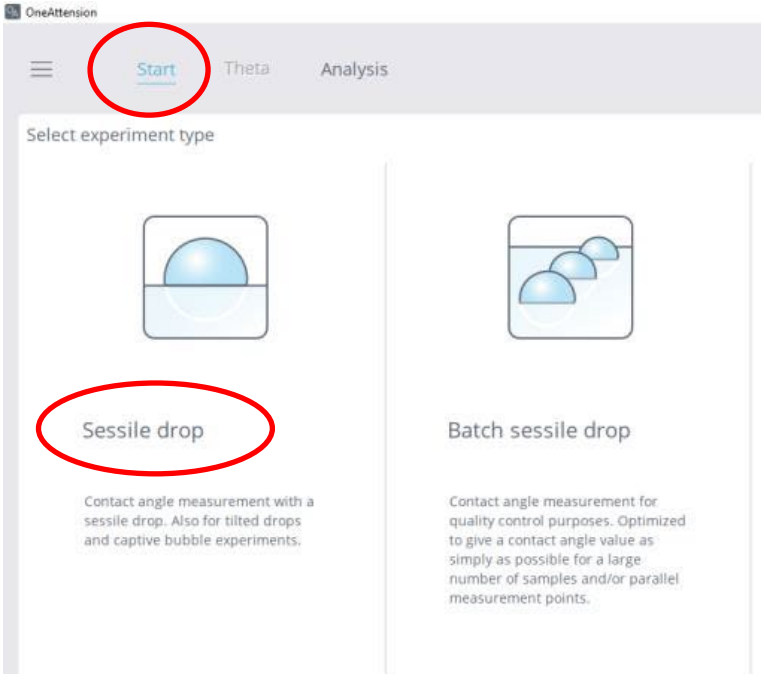
1. Login to computer: User: Shumaker225 Pwd: 225
2. Turn on instrument **BEFORE** opening the software. Toggle switch at the rear end of the tool.



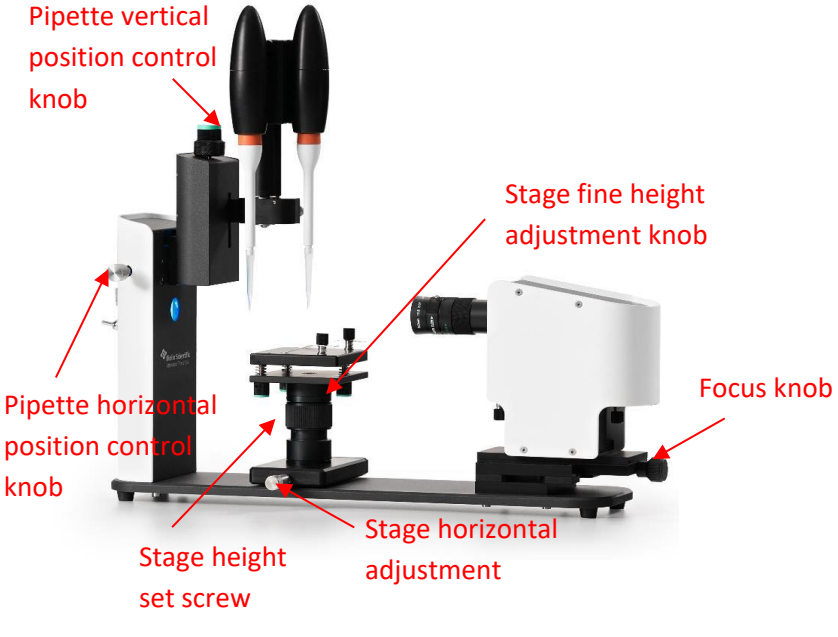
3. Start software: OneAttension and
   Login to software: admin pwd: shumaker



4. Start up and Calibration
   a. From the 'Start' tab click the Sessile drop icon



b. If you have not done so select a pipette tip (200 µl is the default) and load it on the end of the pipette also prepare a clean beaker.
c. After selecting 'Sessile drop', an image of pipette tip should appear; if not, the lens cap may be covering the optics or you may need to turn the pipette position knobs (vertical or horizontal) so that the pipette appears in the frame.

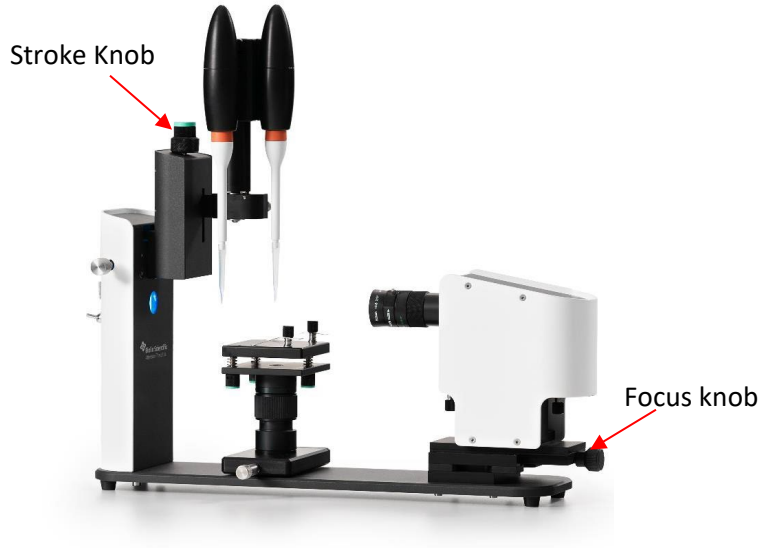


d. Focus on pipette tip using the Focus knob on the right of the tool
e. Click on "Camera parameters" at the bottom left of the screen and select "Autoadjust" in the window that opens. Close the window when done.

5. Fill pipette with liquid using a small beaker. Make sure the liquid is free of particles as this will effect the measurement.
    i. Place tip in liquid. You may need to use the stage height set screw or the Stage fine height adjustment knob to lower the stage.
    ii. In “theta” tab >> controls select dispense to remove remailing liquid and prepare for fill.
    iii. Select “Zero”
    iv. Make sure you have selected the correct pipette
    v. Select “fill” and let it fill to 160 µl or less if you don’t need the whole volume.
    vi. Lower the stage and remove the beaker.
6. Level the stage and calibrate the optics
    a. Lower sample stage so that bubble indicator fits on the stage or remove pipette. Level sample stage using bubble indicator and blue knobs beneath stage
    b. Place calibration ball on the sample stage directly beneath the pipette tip with the blue magnetic holder
    c. Raise sample stage so that the ball is in the field of view
    d. Right click on one edge of the ball in the image and select “focus tool”
    A window pops up, showing the horizontal intensity and its gradient around the focus point. The focus point can be re-selected by clicking on the image again. Now, adjust camera focus with the blue knob at the bottom right of the tool so that the peak of the blue line (the intensity gradient) corresponding the edge of the ball, becomes as high and sharp as possible. The optimal focus and contrast is found when the difference between black and white is maximized. Close the window.
    e. Click on the word “calibrated”. Calibrate with ball should be selected. Verify that the ball diam. setting is 4mm. Avoid creating vibrations on the table and click “Calibrate”. The software responds with “Calibration successful” and displays the calibration value. Values are around 1px = 8.07…E-6m but may vary depending on the optical settings. Select Ok.
    f. Remove ball and store it in the plastic bag.

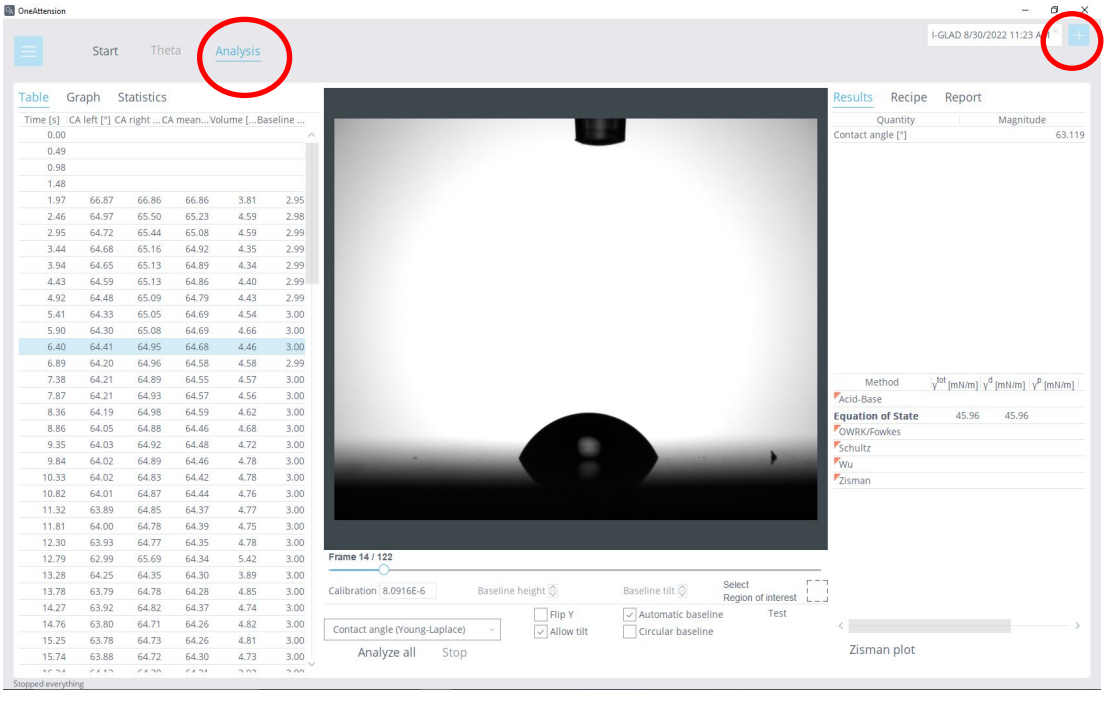
7. Make your first measurement
    a. Place sample on the stage
    b. Select “recipe”
    c. Select a recipe “Si sessile in training”, for eg.
    d. Enter Experiment name and any relevant comments. Select Autosave
    e. Drop in and drop out set to 4 ul in our case
    f. You might also choose “Start from trigger” this will show a cross hair on the screen. By placing the cross-hair where the drop will be placed, the data acquisition will start when the pipette crosses this point.
    g. If the software has difficulty locating the correct baseline one can select “Manual” for the Baseline setting.
    h. Press play for the correct pipette

i. After it is dispensed, deposit the droplet by pressing the ‘stroke knob’, the droplet is deposited on the sample



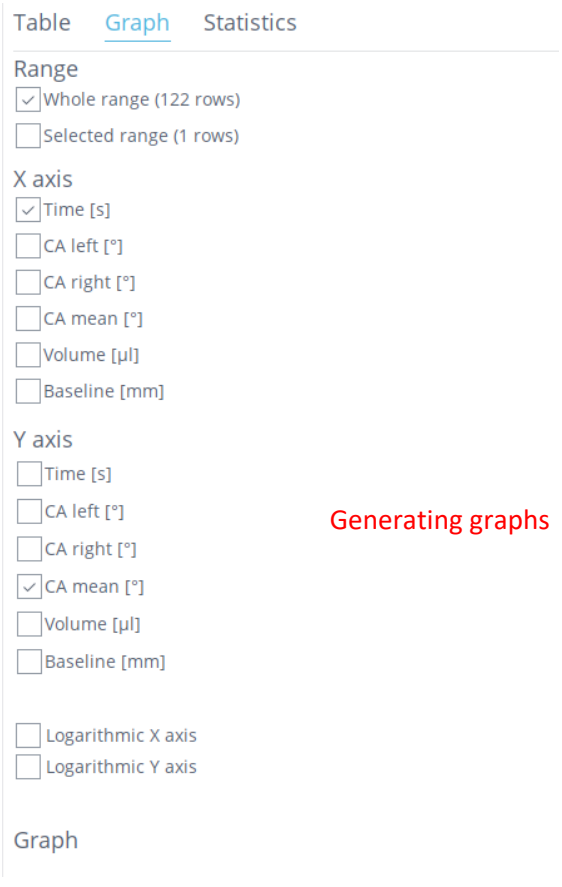
j. Select “Record”

8. Select Analysis
   a. Select the “+” button to see the set of results
   b. Select the appropriate set of results by name/date&time/recipe name/, double click, a dialog pops up ‘Images have not been analyzed. Analyze right away by default settings?’
   c. Select ‘YES’ to analyze automatically by the software; select ‘NO’ if you need to define the baseline yourself
   d. By selecting ‘YES’, the measured contact angles (left, right, mean) for all imaging times are shown in the Table, the frames are shown in the center of the software, as shown below

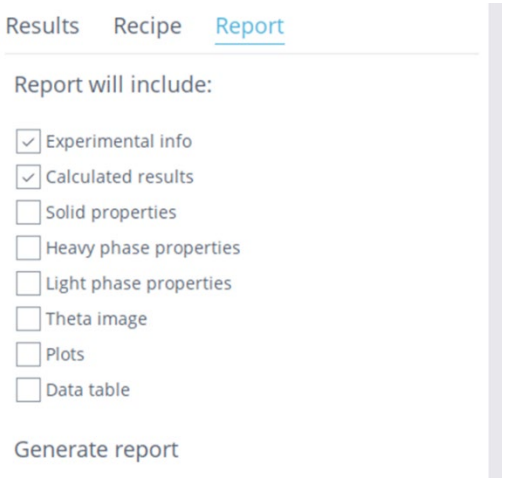


e. Note right clicking in the frame gives a number of options for saving images or video

f. Can select “Graph” tab to display a number of parameters.
g. Can select “Time” vs “Baseline” and see where the baseline has stabilized.
h. Can select the stable range on the table of data to get the most stable baseline
i. Generate report: click ‘Report’ panel and choose the content of the report, then click ‘Generate report’, and save in your file folder.



Generating graphs



Generating report

9. Shut down
    a. Remove sample
    b. Dispense liquid from pipette, and dump all the water in the sink
    c. Close software and turn off power on the left of the instrument
    d. Place lens cap over the camera optics
    e. Turn off the computer.
    f. Log out of the tool in FOM