

Contact Angle S.O.P

Instrument:

ramé-hart™ Model 200 goniometer from ramé-hart instrument co

Software:

Drop Image & Drop Image Pro

Purpose:

To assess the contact angle, adhesiveness, wettability and solid surface free energy of materials.

To Begin:

- **Know the specifications of the instrument.**

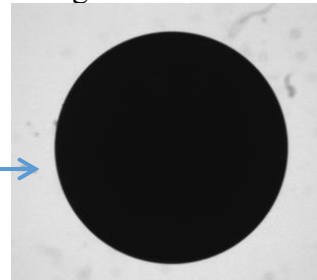
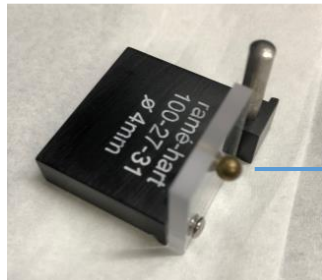
Specifications	
Camera	U4 Series Super Digital 520 frames/s
Stage Tilt Angle	Up to 180°
Compatible Solvents	Water and Organics*
Hydrophobic	>90°
Hydrophilic	<90°

*Use of Organic solvents requires special syringe, adapter and disposable needles, confirm use prior to starting runs.

- **Steps to startup the instrument**

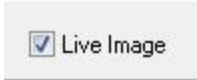
NOTE: The camera is powered by USB connection to the computer. The only power switch is for the light source, light is switched off after use.

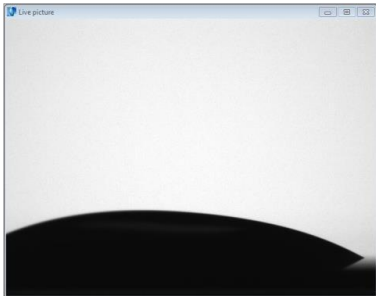
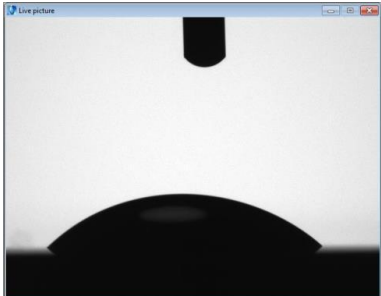
1. Initiate computer, there is no password for the user profile
2. **Open Drop Image or Drop Image Pro**
 - If you are only interested in contact angle, then the standalone Drop Image software will simplify the interface. If you are doing more characterization, then Drop Image Pro is recommended.
3. Calibrate Camera
 - (1) Place the calibrator on the stage. Make sure Live Image is checked.

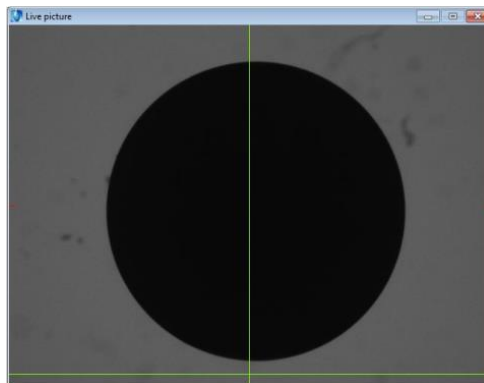


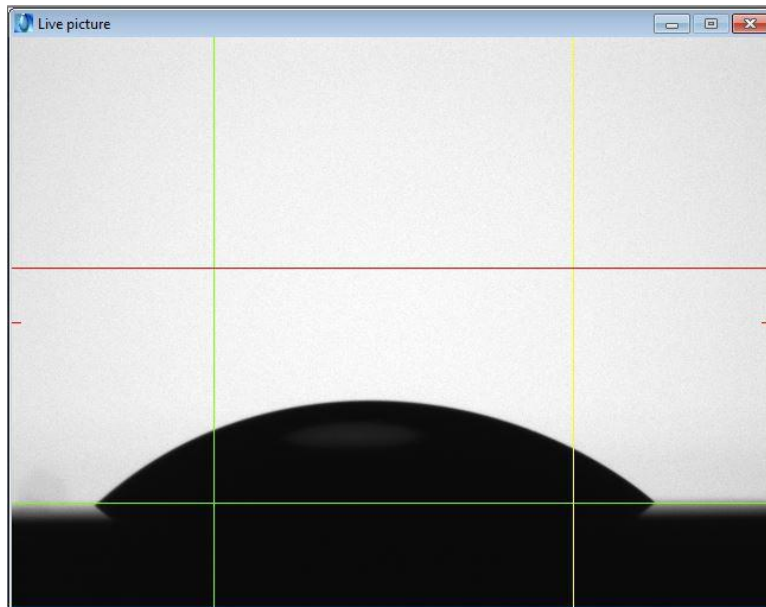
- (2) Adjust stage position. Focus to obtain a well-defined, black sphere
- (3) Make sure the stage is level.
- (4) Go to the **Calibrate tab** and select **New Calibration**

- (a) Make sure that **Diameter** is 4.000 and **Number of runs** is 1 and Click OK
 - (5) Adjust the cursors so that the vertical green cursor goes through the middle of the black sphere and the horizontal green cursor goes through the white space below or above the sphere.
 - (6) Click **Calibrate**. The aspect ratio should be around 1.
(0.9960 < displayed value < 1.0040)
4. Measurement
- (1) Place sample on the stage and adjust position. Make sure that **Live Image** is checked.
 - (2) Check that the stage is level. Make adjustment if needed.
 - (3) Using the syringe, place 1 drop of water onto sample.



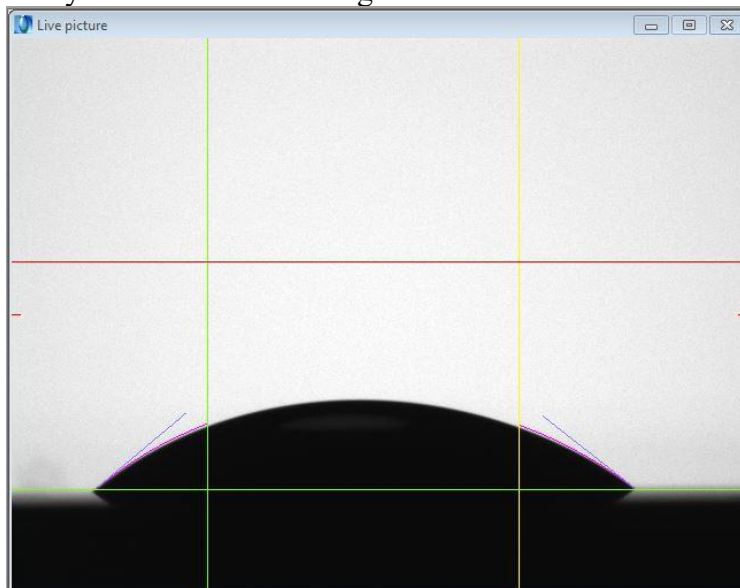
 - (a) Do NOT fill the syringe with anything other than deionized water!!
 - (b) If you expect the contact angle to be low ($< 30^\circ$), place a smaller drop. To do this, allow the water drop to come out of the syringe (but don't release it). Then, bring the stage up to make a contact with the droplet. A normal volume drop will spread out too much (out of the camera's range), thus unable to make a measurement.
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- Out of camera's range
- 
- Within camera's range
- (c) Adjust focus. The focus should be on the droplet
 - (d) Click on **Edit...Options**
 - (e) Make sure 'Use Red Line' is checked
 - (f) Click on **View... Contact Angle Setup...Snap**
 - (g) Or click on this icon
 - (h) This finely adjusts the baseline. BUT, the baseline is not always accurate, further adjustment may be needed.
- (4) Click **Start**. All four cursors will appear
- (a) Red horizontal line (Ctrl + left click) – vertical limit
 - (b) Green horizontal line (Shift + left click) – baseline
 - (c) Green vertical line (left click) – left curvature
 - (d) Yellow vertical line (right click) – right curvature





- (5) Adjust the cursors so that
 - (a) Red horizontal line is an empty area right above the drop.
 - (b) Green horizontal line is the baseline.
 - (c) Green vertical line is on the left side of the drop.
 - (d) Yellow vertical line is on the right side of the drop.

****Note:** the vertical lines must be on the drop, not at the edge, in order for the instrument to draw a tangent line.
- (6) Make sure the image is focused. Click Measure.
- (7) A magenta line is added to draw out the curvature of each side.
- (8) A blue line is added to draw a line tangent to the edge of the curve. The angle formed by the blue line and the green baseline is the contact angle.



- (9) The angle appears in the table is the contact angle. You can compare the value to the image. Sometimes when the angle is too small and/or the water drop doesn't quite fit a curvature of a circle, an incorrect angle can appear.

To Finish:

Data Export

To save data, click Stop. Go to File...Save Contact Angles

To save contact angle image, click Stop, then go to File...Save Picture

- i. To adjust exposure and brightness, go to View...Video Setup...Video Properties

What Does Each Part Do?

