



Bridge You and Nano

Exponential Business and Technologies Company

TESTING AND ANALYSIS REPORT
EDC No. 0202362

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ABOUT THE TEST

Purpose

The test purpose is to determine the advancing and receding angle of 5 glass samples that have been coated with DryWired Glass & Ceramics hydrophobic coatings with water using the extension and contraction method and also in reference to ASTM Standard D7334.

Specimen

The specimens that underwent testing and analysis reported here are five coated glass samples that have been coated with DryWired Glass & Ceramics hydrophobic coatings. The five specimens were labeled 750 hours, 1125 hours, 1500 hours, Coated, and Uncoated respectively. All specimens were tested as received in $\geq 50\%$ relative humidity.

Test Equipment

The analytical instrument used for the advancing and receding angle analysis for the specimens is the Contact Angle Meter model DM-701, made by Kyowa Interface Science Co., Ltd. (Tokyo, Japan). Figure 1 is a picture of the DM-701. It is a high performance, fully automatic contact angle measurement instrument. It combines Kyowa's over 60 years of expertise in designing and manufacturing surface/interface scientific instruments with the latest and advanced technologies in fast imaging and data processing. The model is specifically created for both academic and industrial lab applications with easy use and excellent measurement accuracy. The DM-701 allows for measuring contact angle automatically and repeatedly with high precision algorithms. The fast (60 frame per second) image capturing camera enables characterization of contact angle, wetting, and absorbing as a function of time. DM-701 represents the state of art and quality instrumentation for performing surface and interface study of liquids, solids and their interactions. It enables users to acquire accurate measurements with easy operation through the FAMAS measurement and analysis software package. DM-701 can measure static contact angle, surface free energy, and liquid surface tension. It can also be used to determine dynamic contact angle i.e. contact angle as a function of time, such as advancing and receding angles and the sliding angle.



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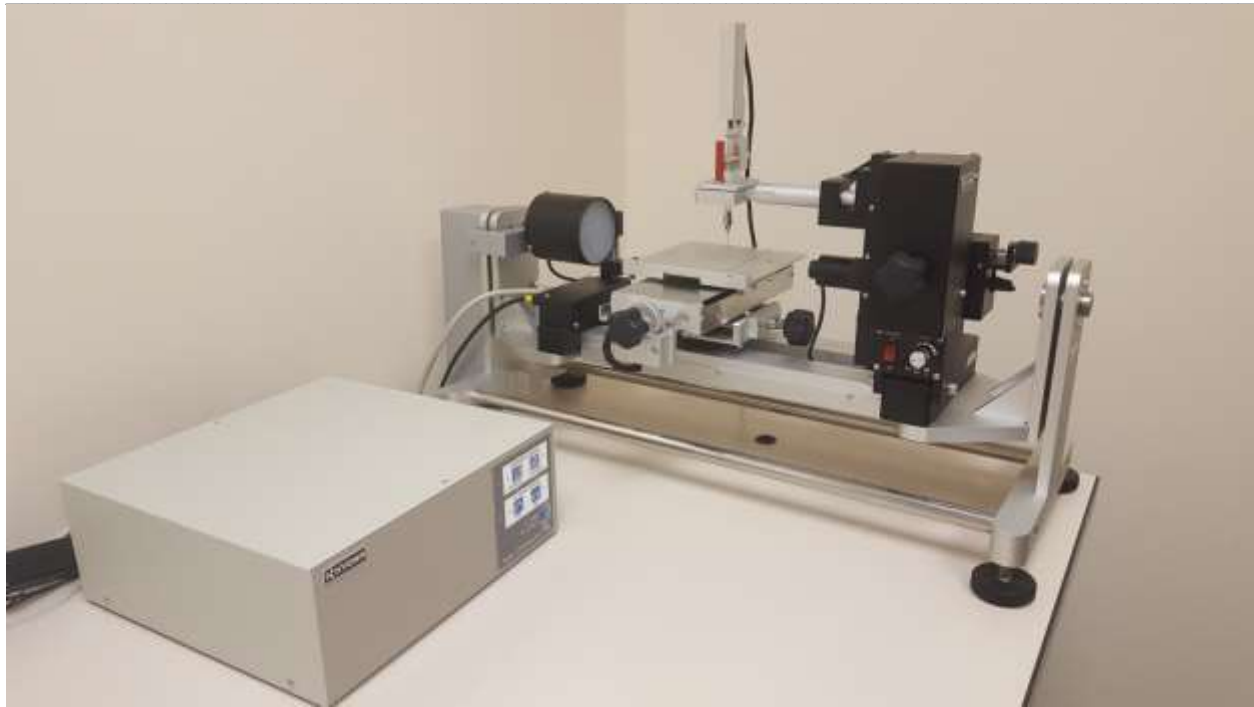


Figure 1. The Kyowa Contact Angle Meter Model DM-701 with sliding angle measurement capability.

Test Conditions and Parameters

To obtain the advancing and receding angles, 3 liquid extension and contraction measurements were recorded for each of the coated glass specimens. A droplet size of $2\mu\text{L}$ was chosen to ensure the initial droplet would deposit on the coating surface. After the deposition of the initial droplet, the DM-701 would automatically dispense or remove the testing liquid during the extension and contraction period respectively. The camera would record the drop images continuously during these periods. After the recording periods all of the drop images would be analyzed by the software to obtain contact angles. The contact angle at the onset of advancing or receding of the liquid drop would be determined as advancing or receding angle. Table 1 presents the testing conditions and parameters for these tests. All samples were tested in $\geq 50\%$ relative humidity according to the ASTM standard.



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Table 1 Extension and Contraction Contact Angle Testing Conditions and Parameters

Liquid Specimen	De-ionized water
Solid Specimen	5 coated glass samples
Test Instrument	DM-701 Contact Angle Meter
Dispenser	22 gauge stainless steel needle
Environment	73 °F, 56% RH



TEST RESULTS AND ANALYSIS

Table 2 presents the average advancing and receding angle data for each tested specimen. Tables 3-12 present the extension and contraction mode angles for each tested specimen. Figure 2 is a plot of average advancing angle and receding angle for all tested specimens. Figures 3-12 are typical image captures of the advancing and receding angles.

Table 2 Contact Angle Test Results (in Degrees) for Each Coated Glass Sample

Sample	Test	1		2		3		Ave.	S. D.
	Side	Left	Right	Left	Right	Left	Right		
750 hours	Advancing Angle	123.5	123.0	119.6	120.0	125.0	124.5	122.6	2.1
	Receding Angle	92.0	95.2	95.0	94.5	95.7	96.5	94.8	1.4
1125 hours	Advancing Angle	110.8	108.8	117.5	115.2	120.6	120.7	115.6	4.5
	Receding Angle	82.1	85.7	88.9	90.7	83.8	88.4	86.6	3.0
1500 hours	Advancing Angle	118.9	118.8	116.9	117.4	118.3	118.7	118.2	0.8
	Receding Angle	94.0	93.2	88.4	90.3	89.2	88.4	90.6	2.2
Coated	Advancing Angle	116.5	117.0	116.5	114.9	114.7	115.3	115.8	0.9
	Receding Angle	80.3	85.7	79.1	78.2	79.7	78.8	80.3	2.5
Uncoated	Advancing Angle	43.6	41.2	38.1	40.7	38.4	35.4	39.6	2.6
	Receding Angle	18.3	18.5	24.0	21.3	19.9	21.7	20.6	2.0



Table 3 Contact Angle Results for 750 hours During Extension Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	105.6	102.4	102.6	104.3	108.9	109.5
100	116.0	114.4	111.8	110.7	120.0	120.0
200	123.5	123.0	119.6	120.0	125.0	124.5
300	119.9	121.7	122.3	121.7	122.8	123.8
400	122.7	119.1	121.0	122.0	121.6	121.9
500	119.3	119.8	121.7	121.9	121.9	120.8
600	120.2	119.4	119.5	121.2	122.5	121.2
700	119.6	119.2	119.8	120.6	121.9	120.0
800	118.2	120.6	120.1	119.4	120.7	125.3
900	119.5	120.3	120.7	119.7	119.7	127.2
1000	117.4	117.7	119.4	121.7	119.8	121.2
1100	118.7	122.5	119.6	118.6	122.6	127.9
1200	116.8	117.2	117.9	126.5	124.3	119.3
1300	117.9	118.3	116.4	116.8	122.6	123.5
1400	117.9	119.5	120.8	117.9	122.7	119.0
1500	117.2	139.9	118.0	123.0	120.1	120.5
1600	116.7	113.8	118.4	118.9	120.5	118.9
1700	113.9	117.2	117.9	119.7	121.2	121.3
1800	118.6	120.7	120.4	120.4	120.0	120.3
1900	119.3	120.6	118.6	118.4	120.0	123.7
2000	119.0	116.7	116.6	122.7	119.5	125.7
2100	122.3	123.5	118.3	119.9	125.2	121.9
2200	117.5	116.2	120.5	120.0	116.9	117.6
2300	117.8	118.8	118.0	121.8	115.9	123.9
2400	118.1	116.2	121.3	119.9	119.0	119.6
2500	118.2	116.8	118.4	120.9	120.4	122.2
2600	119.7	120.1	128.6	122.5	128.8	124.1
2700	117.3	115.8	122.1	118.1	123.6	130.7
2800	120.7	117.7	121.8	119.8	120.1	119.0
2900	120.0	118.1	119.9	120.6	120.6	120.8
3000	121.7	124.3	119.4	118.4	122.2	121.6
3100	119.9	118.5	119.9	121.2	120.7	123.7
3200	118.9	118.5	118.0	118.6	122.0	120.9
3300	122.5	122.9	120.5	120.7	123.4	120.2
3400	121.5	118.2	124.9	118.7	120.1	123.8
3500	124.3	118.8	120.5	120.9	120.0	120.1



3600	117.8	119.9	118.3	120.4	118.6	119.2
3700	117.4	116.8	121.8	126.0	122.6	122.1
3800	119.7	118.7	119.8	120.4	120.6	123.4
3900	121.8	119.0	120.2	119.4	118.7	121.6
4000	122.0	118.3	117.7	119.4	120.5	119.7
4100	117.6	118.6	122.0	123.0	121.4	120.6
4200	116.8	119.7	117.4	120.6	125.5	129.3
4300	117.9	115.7	122.5	123.0	124.1	119.1
4400	123.6	121.4	122.0	124.7	120.4	119.6
4500	124.0	119.4	125.2	121.4	121.1	119.8
4600	114.3	116.4	122.5	121.9	125.8	120.8
4700	112.9	113.5	118.0	120.9	123.1	120.2

Table 4 Contact Angle Results for 750 hours During Contraction Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	115.9	119.4	118.9	118.9	119.0	123.9
100	112.4	119.8	118.6	119.0	118.7	121.7
200	137.7	119.0	120.5	123.5	118.4	116.8
300	118.7	114.8	117.0	118.0	116.7	116.1
400	120.7	116.6	119.2	115.3	115.9	123.0
500	133.7	126.9	114.7	118.8	119.0	116.9
600	118.5	125.4	116.0	117.2	113.9	118.1
700	120.8	116.3	113.6	117.1	123.7	115.8
800	112.1	111.3	113.1	113.1	111.8	120.2
900	105.1	110.7	115.7	113.3	114.8	111.4
1000	103.0	107.8	110.7	117.9	111.0	109.6
1100	97.1	106.1	108.1	112.3	108.7	109.3
1200	100.7	103.7	108.2	108.0	106.8	106.4
1300	95.9	103.8	108.9	107.3	105.7	107.1
1400	96.8	102.7	104.5	105.6	105.0	104.9
1500	97.4	97.9	105.0	102.6	103.5	104.3
1600	96.1	98.2	103.9	102.1	101.1	102.8
1700	90.3	95.9	101.9	102.3	99.9	102.1
1800	92.0	95.2	101.9	101.3	100.5	99.8
1900	92.0	92.2	99.6	95.3	99.0	98.9
2000	90.1	92.8	99.7	98.6	94.8	97.8
2100	93.6	93.0	99.0	99.8	92.9	94.9



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2200	90.1	91.9	97.5	95.7	95.7	96.5
2300	88.0	90.5	96.2	95.5	95.1	96.4
2400	90.1	92.2	95.9	95.2	93.7	95.3
2500	91.1	92.3	95.0	94.5	90.3	96.0
2600	92.2	93.2	94.0	93.8	93.8	93.2
2700	91.8	90.6	95.1	95.2	93.0	93.3
2800	90.0	91.7	95.1	92.8	91.0	93.3
2900	89.5	89.2	92.8	92.6	93.6	92.0
3000	90.7	85.9	94.9	92.7	90.3	91.1
3100	90.0	85.4	94.4	93.8	91.6	91.5
3200	94.3	85.0	92.2	92.2	93.4	91.2
3300	92.5	82.5	92.8	91.4	92.9	89.1
3400	90.8	79.4	94.0	93.5	92.7	90.0
3500	91.4	81.5	94.3	94.4	91.5	87.5
3600	91.3	78.9	91.6	90.8	91.1	87.8
3700	91.4	79.0	93.1	93.1	85.4	88.3
3800	89.5	89.8	92.2	90.6	80.2	81.3
3900	86.3	89.2	91.7	89.7	77.1	80.8
4000	86.3	91.1	91.2	88.4	71.5	81.4
4100	87.3	87.9	93.0	91.4	71.9	92.6
4200	84.6	86.6	91.0	88.1	71.4	94.1
4300	83.9	88.7	90.2	89.7	69.7	92.6
4400	88.1	87.9	90.6	90.1	86.6	94.1
4500	86.5	86.4	90.0	88.8	90.5	91.1
4600	85.1	87.7	88.6	90.8	88.5	91.6
4700	83.6	85.4	87.1	88.4	88.9	89.4

Table 5 Contact Angle Results for 1125 hours During Extension Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	93.8	89.3	110.3	109.1	102.5	106.2
100	110.8	108.8	117.5	115.2	120.6	120.7
200	110.8	108.8	118.0	116.5	118.4	123.4
300	110.5	107.2	117.5	116.5	118.3	116.7
400	109.8	106.8	116.7	115.7	119.4	117.0
500	108.8	106.6	115.9	114.2	121.1	120.1
600	108.3	104.2	115.9	114.2	119.5	120.9
700	109.8	101.9	112.8	111.1	119.7	116.3



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800	111.3	101.3	118.5	121.4	122.0	118.0
900	108.5	100.9	114.5	113.0	120.5	116.5
1000	97.3	100.1	116.0	126.8	123.7	117.6
1100	94.5	98.3	112.9	113.8	121.8	115.3
1200	99.9	96.3	114.0	111.7	115.8	115.3
1300	108.7	98.0	114.0	113.0	121.8	117.4
1400	108.3	96.1	112.0	111.8	119.0	120.4
1500	109.9	95.9	111.6	109.0	118.3	114.3
1600	113.3	95.7	114.3	110.7	116.2	115.7
1700	115.8	96.4	113.0	122.7	124.0	113.2
1800	111.7	96.0	121.1	117.4	118.6	113.2
1900	99.8	84.3	114.9	115.3	118.1	121.9
2000	114.0	96.9	114.0	112.0	117.6	114.4
2100	114.2	98.8	114.2	114.7	120.5	115.2
2200	115.9	98.3	114.0	113.3	114.3	115.0
2300	116.2	99.2	115.2	113.6	113.6	109.2
2400	116.1	98.4	121.4	113.7	114.2	113.6
2500	115.3	99.3	115.3	112.6	114.1	114.9
2600	114.1	99.8	119.5	113.2	111.5	112.7
2700	114.9	100.5	115.9	119.9	111.3	113.1
2800	113.6	104.7	119.3	117.2	115.4	114.7
2900	115.4	105.0	112.2	118.5	113.8	112.8
3000	114.0	103.3	116.1	114.9	111.3	112.7
3100	116.5	104.6	117.9	114.9	112.5	117.4
3200	113.8	106.2	114.6	113.2	111.9	110.6
3300	113.8	106.2	118.7	114.0	111.8	119.6
3400	114.3	104.7	114.5	112.0	112.5	114.4
3500	113.0	107.1	117.7	112.1	110.3	109.4
3600	113.0	106.3	112.8	115.9	111.6	112.7
3700	115.0	107.0	115.1	111.1	109.6	108.8
3800	113.6	107.3	116.3	112.3	114.0	116.6
3900	114.1	107.9	117.8	112.3	111.5	113.1
4000	113.4	112.9	119.5	112.9	110.8	113.5
4100	119.5	113.7	115.0	110.8	111.0	117.5
4200	113.2	109.3	115.3	116.0	109.6	109.9
4300	111.9	124.0	115.2	112.5	109.1	111.8
4400	112.5	108.9	110.7	111.8	109.1	112.0
4500	112.2	112.6	113.6	116.5	108.8	111.0
4600	113.4	106.9	112.9	113.1	108.2	111.0
4700	113.4	119.4	114.0	115.3	110.5	115.8



Table 6 Contact Angle Results for 1125 hours During Contraction Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	111.4	105.1	109.0	111.0	101.4	110.6
100	109.2	104.0	108.3	109.1	100.7	110.9
200	93.0	90.9	107.5	109.0	100.6	109.3
300	105.7	102.7	106.1	112.5	96.4	104.0
400	102.4	100.3	99.6	100.4	96.4	105.3
500	102.4	100.6	102.9	103.2	96.6	105.2
600	99.6	101.5	98.8	97.5	96.2	101.7
700	90.4	89.5	98.8	98.3	95.3	100.8
800	91.8	94.5	98.2	97.1	93.6	100.8
900	95.9	97.0	93.8	91.9	91.2	99.2
1000	94.1	97.2	96.1	95.4	91.9	97.7
1100	90.1	93.3	92.8	93.1	90.3	98.4
1200	89.4	94.6	93.4	91.3	87.1	95.2
1300	83.0	86.6	89.9	90.4	86.1	93.7
1400	82.1	85.7	90.9	91.9	83.0	89.8
1500	81.2	80.8	88.9	90.7	83.8	88.4
1600	85.5	90.1	89.6	88.9	87.7	93.3
1700	86.8	89.3	89.7	91.3	85.6	89.2
1800	87.1	89.0	92.2	91.4	88.6	89.5
1900	88.4	89.9	90.6	87.7	89.6	90.3
2000	88.0	89.4	89.2	88.9	88.1	89.1
2100	88.2	89.1	85.8	85.7	89.7	88.4
2200	89.3	88.3	91.2	89.9	89.6	90.2
2300	89.5	87.6	91.3	86.0	86.9	86.9
2400	85.8	88.1	91.4	89.6	87.4	89.0
2500	84.8	86.3	89.9	85.0	86.2	89.0
2600	84.5	86.1	91.4	87.9	88.6	88.1
2700	88.4	83.8	91.4	85.4	89.7	87.7
2800	88.5	85.2	89.9	83.5	87.9	84.9
2900	84.9	82.6	90.9	84.3	88.5	82.5
3000	75.6	81.4	90.5	85.4	88.1	85.6
3100	70.0	80.9	90.7	87.2	88.2	86.4
3200	70.5	79.7	90.1	84.5	88.6	83.1
3300	76.3	80.2	91.4	86.7	89.3	82.4
3400	83.1	77.2	86.4	80.8	86.9	83.8
3500	79.6	73.8	88.4	84.0	86.7	78.1



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3600	79.6	73.4	89.1	81.0	88.8	81.0
3700	74.9	69.7	85.1	80.6	86.9	80.2
3800	73.0	74.5	81.3	78.2	87.6	81.3
3900	65.2	68.4	81.8	77.2	85.7	79.4
4000	62.8	66.1	73.1	69.3	83.6	71.7
4100	64.8	70.0	70.8	65.3	72.8	67.9
4200	57.4	60.7	71.8	67.4	72.1	59.6
4300	55.0	58.4	65.9	60.0	47.7	52.4
4400	49.0	56.4	62.7	53.0	55.3	61.3
4500	54.0	53.7	52.3	44.5	-----	-----
4600	45.9	40.1	46.5	62.9	-----	-----
4700	-----	-----	44.4	71.6	-----	-----

Table 7 Contact Angle Results for 1500 hours During Extension Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	109.1	110.6	102.7	104.1	110.4	112.0
100	114.8	115.4	119.5	118.7	118.3	118.7
200	118.9	118.8	116.9	117.4	119.0	117.2
300	116.0	118.7	117.0	116.1	117.2	116.9
400	117.5	114.9	114.9	116.4	115.6	118.0
500	116.4	114.1	112.2	111.9	115.1	118.3
600	114.6	114.2	115.0	122.7	118.4	124.0
700	115.8	111.5	116.8	128.4	115.7	114.5
800	114.7	113.0	116.2	125.8	114.9	116.2
900	117.2	114.5	114.9	120.3	119.1	115.8
1000	118.4	126.2	116.7	114.9	118.8	115.0
1100	122.9	130.5	115.9	119.0	116.6	118.7
1200	119.5	114.6	115.0	115.2	112.7	116.2
1300	116.5	116.6	116.3	115.3	115.1	115.3
1400	121.0	113.0	115.4	114.5	115.2	114.5
1500	114.7	118.2	121.0	127.8	114.2	113.3
1600	114.8	112.6	115.1	117.9	116.1	112.8
1700	117.9	113.1	119.0	116.0	115.1	113.6
1800	118.1	120.3	115.2	115.2	115.3	113.6
1900	117.0	114.3	118.2	115.7	119.9	119.5
2000	115.8	121.5	116.0	115.3	114.3	114.0
2100	116.2	114.5	115.6	116.3	115.7	114.3



2200	118.6	117.1	115.6	114.2	115.2	118.9
2300	116.6	114.1	116.0	114.8	113.7	114.6
2400	120.3	115.4	116.1	121.3	114.9	117.6
2500	116.4	114.5	113.6	115.4	114.5	113.2
2600	114.4	113.8	116.1	122.1	116.3	122.4
2700	113.5	114.4	116.3	126.8	116.1	113.6
2800	113.6	113.4	116.4	121.7	116.8	111.9
2900	116.8	113.4	113.6	113.1	113.5	113.9
3000	115.2	117.6	113.6	115.5	116.6	122.3
3100	119.3	115.9	113.6	115.7	117.3	115.2
3200	115.7	120.3	116.8	115.2	114.6	114.2
3300	118.6	115.4	113.9	118.2	120.4	114.6
3400	114.5	115.2	113.2	113.1	119.5	118.1
3500	116.6	115.9	114.6	115.4	115.6	115.0
3600	115.5	114.0	114.2	114.2	113.2	112.7
3700	115.8	119.5	116.3	122.8	114.6	118.3
3800	115.9	117.8	117.7	112.3	113.3	118.2
3900	115.9	114.9	112.5	114.3	114.6	119.4
4000	115.7	118.7	112.5	113.6	115.0	114.3
4100	116.2	114.8	115.1	113.2	115.4	112.9
4200	116.0	118.4	113.2	113.9	114.8	114.4
4300	117.9	118.6	117.9	112.6	114.8	119.6
4400	115.8	114.8	114.4	120.7	118.7	115.2
4500	118.1	115.5	113.6	113.9	114.2	113.5
4600	116.3	115.9	114.1	113.3	119.2	118.1
4700	116.5	117.6	112.9	114.6	117.9	114.0

Table 8 Contact Angle Results for 1500 hours During Contraction Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	113.5	112.5	112.3	111.9	114.6	111.3
100	114.8	112.0	114.4	112.0	112.7	113.3
200	113.8	111.1	114.7	119.5	113.6	110.4
300	117.3	112.0	111.0	109.6	108.5	109.1
400	110.9	114.8	106.0	110.0	111.3	111.6
500	114.7	114.1	107.4	107.4	109.0	106.7
600	113.1	116.7	104.7	105.1	108.9	105.5
700	105.3	108.1	103.9	104.7	104.8	102.5
800	102.1	103.1	102.5	101.6	103.3	100.1



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900	101.7	102.9	101.0	98.9	102.3	100.1
1000	99.2	101.5	99.4	97.7	99.3	99.9
1100	98.3	99.3	97.7	97.6	98.3	98.7
1200	95.6	97.6	96.6	95.2	97.8	94.7
1300	93.9	97.1	96.3	92.7	95.9	96.9
1400	94.3	96.0	91.2	92.1	94.5	94.0
1500	93.8	94.4	92.3	93.7	92.7	93.9
1600	92.5	92.4	89.9	93.5	92.0	90.7
1700	94.0	93.2	89.9	87.0	89.2	88.4
1800	92.7	93.4	88.4	90.3	87.4	88.7
1900	93.8	92.8	90.4	91.2	86.5	90.9
2000	95.1	92.8	89.5	89.7	91.3	88.1
2100	95.1	93.2	91.1	91.7	90.5	90.6
2200	89.9	90.6	90.9	91.8	91.8	88.3
2300	92.0	92.4	91.2	89.0	91.4	88.2
2400	93.8	92.0	93.0	91.0	91.4	87.2
2500	95.1	91.8	92.4	91.2	91.4	87.6
2600	91.9	93.8	90.6	88.6	89.6	86.2
2700	89.5	88.2	89.4	90.3	90.9	88.4
2800	90.9	92.3	90.3	88.1	88.4	89.2
2900	90.7	91.2	91.1	90.7	91.4	87.7
3000	87.5	92.7	88.0	87.6	89.1	87.2
3100	80.6	90.7	89.6	89.5	89.8	88.3
3200	85.6	92.3	89.6	89.2	90.5	90.2
3300	85.4	87.9	88.0	89.5	91.7	91.9
3400	89.3	89.1	89.4	89.6	87.9	88.5
3500	86.1	83.2	89.1	88.7	88.9	87.3
3600	89.9	92.3	89.0	90.1	87.1	88.9
3700	90.0	92.5	89.1	87.7	90.9	88.5
3800	85.5	87.9	87.6	88.6	86.1	80.8
3900	89.2	92.3	88.9	87.6	86.8	78.2
4000	90.7	91.9	85.8	85.5	87.0	82.7
4100	91.1	94.4	86.2	87.6	85.4	85.3
4200	89.0	91.8	87.6	86.8	79.0	82.2
4300	83.8	86.7	83.6	83.6	80.9	76.8
4400	83.6	85.8	80.0	82.7	76.7	71.5
4500	79.1	81.1	75.6	78.4	69.2	65.5
4600	68.2	67.7	65.5	69.7	60.8	52.8
4700	52.1	43.8	51.7	55.6	53.6	56.2



Table 9 Contact Angle Results for Coated During Extension Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	109.8	108.3	104.2	103.9	104.5	104.2
100	116.7	117.2	116.5	114.9	114.7	115.3
200	116.5	117.0	113.4	112.1	113.3	112.4
300	117.0	114.8	114.1	110.7	112.5	112.5
400	113.3	111.5	112.3	111.2	114.0	113.9
500	112.7	111.6	113.0	109.5	113.8	112.0
600	112.0	111.7	111.6	110.0	112.9	112.0
700	113.3	112.4	111.6	105.7	112.4	114.7
800	108.4	107.5	110.9	106.2	112.8	111.9
900	112.0	113.1	111.0	106.8	111.9	112.5
1000	115.5	115.0	109.3	106.6	112.7	113.5
1100	114.0	117.8	110.6	106.7	111.8	111.2
1200	113.0	113.0	109.2	108.0	111.5	111.5
1300	115.0	113.3	107.7	106.5	115.4	112.5
1400	112.4	118.6	108.2	107.6	110.8	111.9
1500	111.1	112.3	109.0	106.7	111.3	114.9
1600	116.6	113.0	108.1	107.8	113.9	113.2
1700	114.3	113.8	109.0	109.4	110.5	111.2
1800	112.6	119.9	107.0	108.9	112.1	110.9
1900	113.3	113.1	108.3	110.0	112.8	111.8
2000	113.9	117.4	108.4	107.2	110.9	111.7
2100	114.7	113.8	107.3	107.2	115.2	123.7
2200	115.5	114.1	109.0	113.8	118.2	113.7
2300	111.3	112.3	108.9	106.9	113.4	117.0
2400	114.5	120.4	109.9	109.4	118.5	117.8
2500	114.0	116.2	113.3	110.0	112.4	112.8
2600	113.5	115.9	110.3	109.2	111.8	116.0
2700	119.2	115.3	109.0	109.2	114.4	111.4
2800	114.2	115.3	110.2	109.1	110.8	111.3
2900	112.9	113.6	112.6	111.7	112.0	112.6
3000	114.2	119.7	112.5	111.2	112.7	110.4
3100	113.0	117.1	111.6	114.2	112.4	119.1
3200	112.1	115.1	109.7	111.3	113.7	117.2
3300	113.2	114.3	115.6	110.8	118.6	115.8
3400	114.2	118.9	115.6	111.1	114.2	112.7
3500	114.0	115.3	112.1	111.2	111.8	111.5



3600	111.5	114.3	119.2	110.8	115.4	112.7
3700	115.8	116.5	112.5	112.3	119.7	113.6
3800	113.4	115.7	110.7	111.0	112.8	117.0
3900	112.8	117.9	117.1	111.1	111.7	112.9
4000	111.9	116.2	116.6	111.9	111.7	113.7
4100	112.4	115.8	112.0	111.2	112.0	111.8
4200	112.4	115.2	109.7	113.5	113.4	108.2
4300	114.2	115.7	117.9	110.3	111.3	112.0
4400	114.8	117.5	115.6	113.2	111.6	110.6
4500	113.0	114.6	113.1	111.1	102.1	103.2
4600	113.0	115.1	113.4	111.5	111.4	114.2
4700	113.3	115.3	113.9	113.7	110.7	112.8

Table 10 Contact Angle Results for Coated During Contraction Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	112.1	110.3	109.9	110.4	114.9	110.2
100	112.1	111.4	109.1	108.4	110.2	108.5
200	107.7	110.2	107.9	110.9	109.8	106.1
300	110.7	111.3	107.2	106.7	106.4	106.7
400	106.3	108.5	105.7	103.6	106.3	105.0
500	106.2	105.8	105.3	102.9	104.4	100.8
600	105.0	105.5	104.0	101.5	102.2	100.3
700	101.9	103.2	102.6	99.4	99.9	95.0
800	100.8	102.7	100.0	98.9	100.5	98.3
900	99.3	101.0	98.3	95.9	100.7	95.3
1000	97.3	100.9	99.3	94.7	100.1	94.9
1100	97.6	99.1	95.8	93.4	97.1	95.3
1200	95.8	98.6	96.1	91.4	96.7	93.6
1300	92.5	95.4	94.5	91.4	95.8	94.2
1400	91.9	94.2	92.5	92.7	93.1	92.7
1500	91.2	94.5	91.1	89.3	92.9	91.0
1600	89.3	93.1	93.2	90.3	89.5	88.0
1700	85.0	91.0	90.1	87.6	87.6	84.9
1800	84.7	89.1	87.7	86.4	87.5	88.0
1900	83.6	87.6	83.5	84.8	87.4	84.8
2000	84.0	86.9	83.4	84.2	83.0	81.2
2100	81.4	85.6	83.8	83.3	81.1	79.2
2200	80.5	85.3	80.7	82.3	81.9	80.6



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2300	80.3	85.7	81.5	80.0	82.8	80.2
2400	76.9	84.4	78.2	79.7	79.7	78.8
2500	74.1	83.2	79.1	78.2	79.4	77.8
2600	75.1	83.5	79.3	76.6	78.8	76.8
2700	72.5	81.9	75.1	78.6	76.2	77.7
2800	77.2	82.9	70.7	77.6	80.5	74.6
2900	78.2	84.0	77.4	76.2	76.9	72.3
3000	79.5	82.4	76.8	73.6	77.2	71.9
3100	79.8	83.9	72.1	69.2	75.9	70.3
3200	79.1	84.3	74.7	69.7	75.9	70.8
3300	82.8	84.2	72.8	70.2	75.6	70.7
3400	80.4	83.1	70.6	71.8	75.2	70.8
3500	80.5	83.1	70.7	70.5	69.1	67.8
3600	81.5	80.8	66.3	68.9	68.9	66.9
3700	81.9	81.4	63.4	65.5	69.5	65.2
3800	81.1	81.9	63.0	59.9	68.9	61.6
3900	78.4	80.2	57.9	61.4	64.6	63.5
4000	77.5	77.4	59.0	54.6	59.7	59.5
4100	75.9	76.5	54.8	50.3	58.1	55.0
4200	70.6	73.9	51.8	48.4	57.6	53.7
4300	70.5	69.3	50.1	43.2	56.3	54.0
4400	66.5	64.4	48.1	49.7	49.9	44.6
4500	58.8	59.7	46.9	53.3	40.5	58.9
4600	51.3	56.9	36.0	48.2	43.4	26.6
4700	46.6	50.1	31.9	48.7	40.7	89.7

Table 11 Contact Angle Results for Uncoated During Extension Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	40.2	35.6	35.1	30.3	42.9	45.4
100	49.6	43.9	35.3	34.2	38.4	35.4
200	43.6	41.2	38.1	40.7	36.8	35.1
300	45.3	42.1	36.1	39.2	35.4	34.2
400	40.4	40.4	39.9	39.0	34.8	35.3
500	41.4	41.0	34.4	37.1	35.0	34.6
600	40.8	40.8	35.0	31.8	34.2	36.3
700	41.4	43.9	34.6	34.6	31.2	34.3
800	42.3	43.5	45.9	44.1	31.0	32.9
900	40.5	40.0	45.6	45.6	31.5	33.1



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1000	42.1	40.5	36.7	36.8	39.9	34.2
1100	40.5	42.0	37.3	34.2	39.2	41.5
1200	40.8	47.8	35.4	33.9	34.6	35.7
1300	46.7	43.9	36.4	37.1	37.3	33.1
1400	40.2	39.7	40.6	40.6	34.2	38.6
1500	43.7	41.8	37.3	40.0	44.6	46.3
1600	44.3	41.6	45.6	45.9	41.9	39.8
1700	38.2	40.1	37.1	37.6	41.9	39.8
1800	37.8	42.3	39.3	36.4	35.5	35.5
1900	38.1	39.1	43.3	41.0	36.0	39.9
2000	38.5	40.9	36.3	39.0	44.5	41.9
2100	38.5	40.8	40.4	37.9	37.2	40.7
2200	43.2	40.8	43.7	41.1	37.7	38.2
2300	40.3	40.9	39.8	38.9	40.7	37.9
2400	40.2	39.6	36.1	39.5	41.9	43.9
2500	46.7	42.8	32.6	39.4	40.6	43.5
2600	38.6	40.0	36.7	39.8	35.8	38.4
2700	35.9	41.3	45.1	41.9	45.5	48.3
2800	37.7	42.7	42.9	39.1	39.8	36.3
2900	37.9	43.9	40.4	37.4	39.7	34.4
3000	49.0	53.1	36.9	41.1	42.6	40.2
3100	39.6	37.3	43.6	39.1	39.4	36.1
3200	36.7	38.6	35.3	34.6	36.4	35.4
3300	41.9	38.4	36.7	40.4	36.5	39.2
3400	38.0	38.9	41.4	37.7	36.4	40.6
3500	40.2	38.3	34.5	39.0	45.9	41.4
3600	46.3	45.0	36.2	38.5	37.0	39.9
3700	36.9	39.9	45.6	45.9	36.5	40.1
3800	38.3	36.2	40.2	45.8	37.5	41.4
3900	38.9	41.3	34.0	39.9	36.4	37.6
4000	35.1	36.2	40.2	43.6	40.1	44.6
4100	35.6	40.6	43.8	41.4	39.7	40.4
4200	38.4	42.8	40.2	43.1	41.0	40.4
4300	37.4	37.0	35.8	39.7	42.3	41.1
4400	44.8	42.5	40.2	38.4	40.9	41.0
4500	37.7	40.2	42.4	39.1	43.7	39.7
4600	37.2	43.2	34.3	39.1	39.6	39.6
4700	37.6	41.5	41.9	41.2	43.6	39.1



Table 12 Contact Angle Results for Uncoated During Contraction Mode

Time (ms)	Test 1 (deg.)		Test 2 (deg.)		Test 3 (deg.)	
	Left	Right	Left	Right	Left	Right
0	43.2	41.1	36.7	39.9	41.9	40.6
100	39.6	35.9	36.4	34.4	39.7	35.4
200	41.8	39.9	38.2	34.4	34.5	34.8
300	43.0	45.2	38.6	35.8	41.9	35.4
400	39.7	36.5	36.3	38.0	38.6	37.3
500	36.4	35.5	42.7	37.6	35.0	36.2
600	36.2	35.0	42.9	42.1	35.8	33.5
700	36.4	37.4	36.9	38.6	32.2	32.6
800	39.0	39.8	37.2	40.2	38.3	33.2
900	42.1	44.9	33.9	33.5	39.5	30.4
1000	28.5	28.1	32.7	39.8	35.3	31.9
1100	29.8	32.0	32.7	31.5	38.4	28.8
1200	41.1	42.8	27.8	22.8	35.6	31.3
1300	22.2	26.4	31.2	32.0	36.8	39.9
1400	22.2	22.6	32.4	46.4	36.9	32.8
1500	31.1	30.8	24.7	23.6	34.8	33.3
1600	32.1	30.5	29.2	29.0	29.0	29.4
1700	25.6	23.4	29.6	27.1	23.6	29.7
1800	24.7	28.3	31.9	30.1	26.4	22.9
1900	19.9	21.5	25.7	28.6	26.9	28.5
2000	16.0	16.6	26.8	23.6	23.6	24.6
2100	20.1	21.4	26.7	26.4	23.1	23.2
2200	18.7	20.2	24.0	21.3	19.4	22.3
2300	15.5	15.7	29.2	21.2	19.9	21.7
2400	15.5	18.2	24.1	24.4	18.9	22.5
2500	18.3	18.5	28.9	25.1	20.6	22.3
2600	15.1	13.1	34.6	28.5	14.0	18.5
2700	13.0	13.0	19.1	19.0	23.8	18.3
2800	13.0	14.0	27.1	22.1	15.2	16.4
2900	16.8	13.5	23.4	26.0	13.2	16.7
3000	16.7	15.7	20.4	21.0	16.0	20.1
3100	12.3	9.7	22.7	25.3	15.1	16.3
3200	-----	-----	20.9	18.8	-----	-----
3300	-----	-----	-----	-----	-----	-----
3400	-----	-----	-----	-----	-----	-----
3500	-----	-----	-----	-----	-----	-----
3600	-----	-----	-----	-----	-----	-----



3700	-----	-----	-----	-----	-----	-----
3800	4.1	8.9	-----	-----	-----	-----
3900	-----	-----	-----	-----	4.2	2.2
4000	3.4	6.8	-----	-----	-----	-----
4100	-----	-----	-----	-----	-----	-----
4200	-----	-----	-----	-----	-----	-----
4300	-----	-----	-----	-----	-----	-----
4400	-----	-----	-----	-----	-----	-----
4500	-----	-----	-----	-----	-----	-----
4600	-----	-----	-----	-----	-----	-----
4700	-----	-----	-----	-----	-----	-----

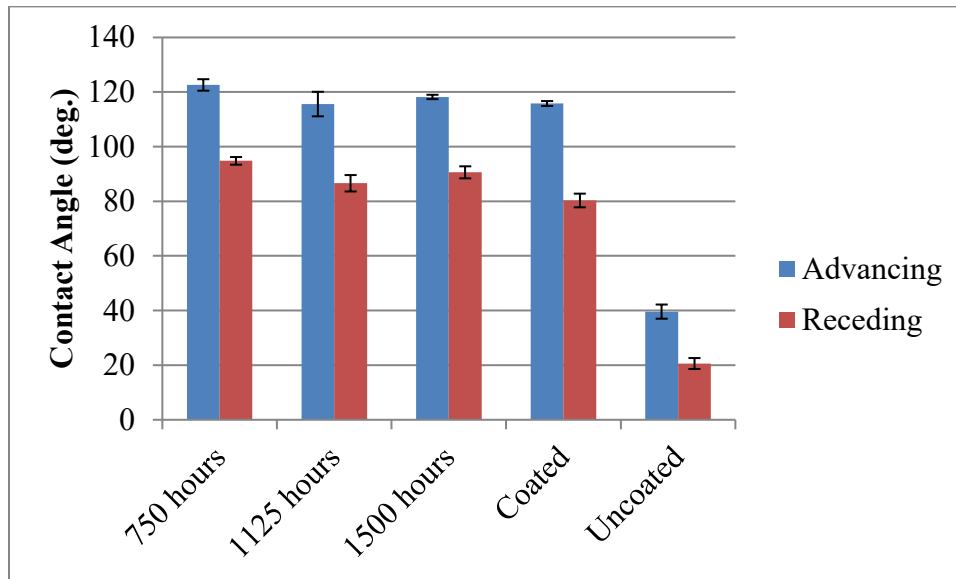


Figure 2. Average advancing and receding angles for de-ionized water measured on all tested specimens.



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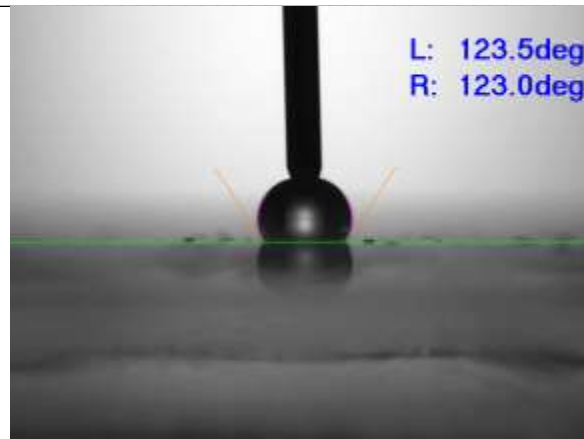


Figure 3. A typical image capture from Test 1 of a water droplet on 750 hours for advancing contact angle analysis; an eclipse fitting analysis routine has been selected.

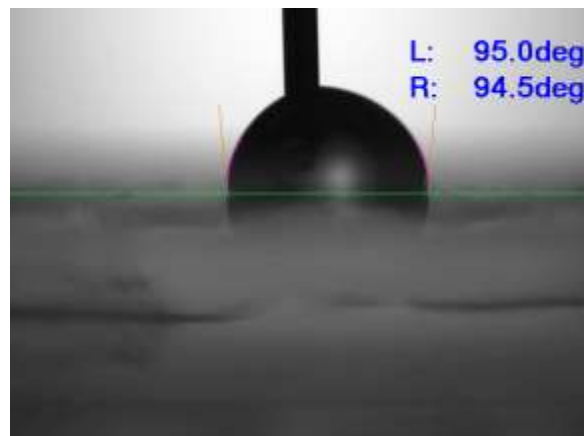


Figure 4. A typical image capture from Test 2 of a water droplet on 750 hours for receding contact angle analysis; an eclipse fitting analysis routine has been selected.

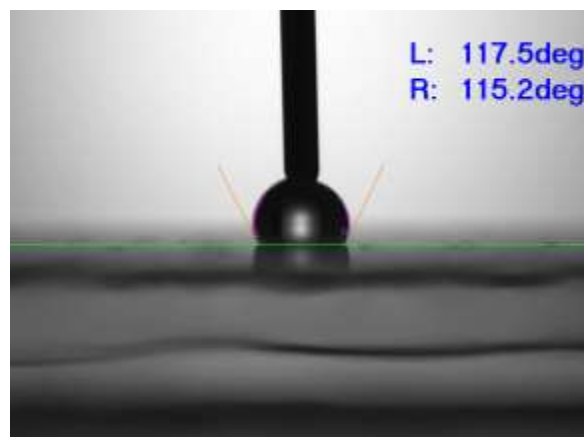


Figure 5. A typical image capture from Test 2 of a water droplet on 1125 hours for advancing contact angle analysis; an eclipse fitting analysis routine has been selected.

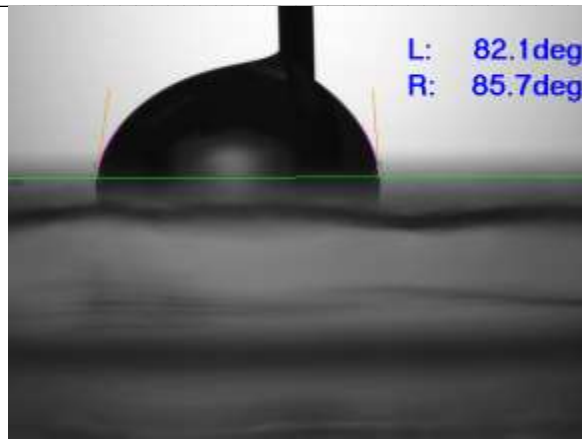


Figure 6. A typical image capture from Test 1 of a water droplet on 1125 hours for receding contact angle analysis; an eclipse fitting analysis routine has been selected.

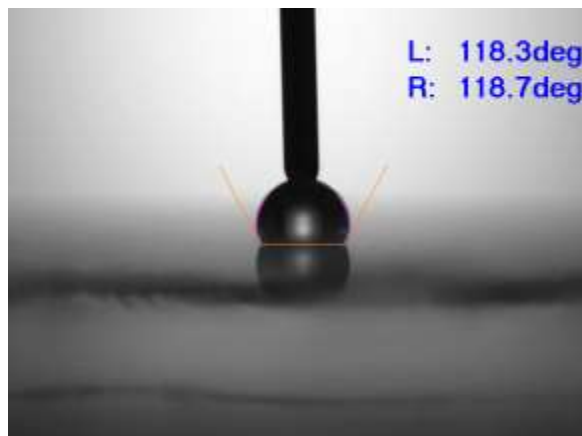


Figure 7. A typical image capture from Test 3 of a water droplet on 1500 hours for advancing contact angle analysis; an eclipse fitting analysis routine has been selected.

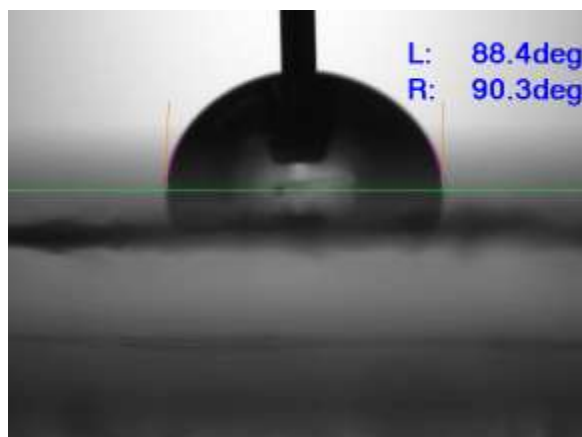


Figure 8. A typical image capture from Test 2 of a water droplet on 1500 hours for receding contact angle analysis; an eclipse fitting analysis routine has been selected.



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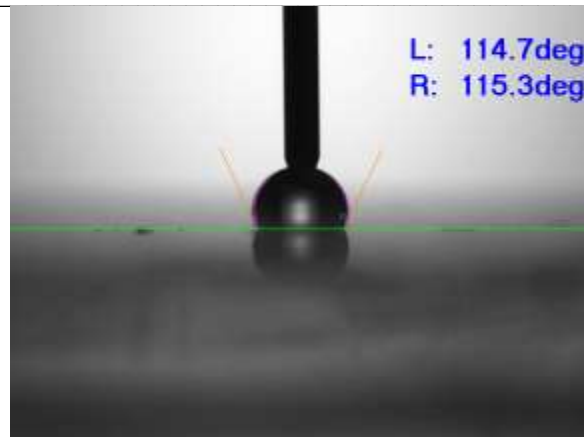


Figure 9. A typical image capture from Test 3 of a water droplet on Coated for advancing contact angle analysis; an eclipse fitting analysis routine has been selected.

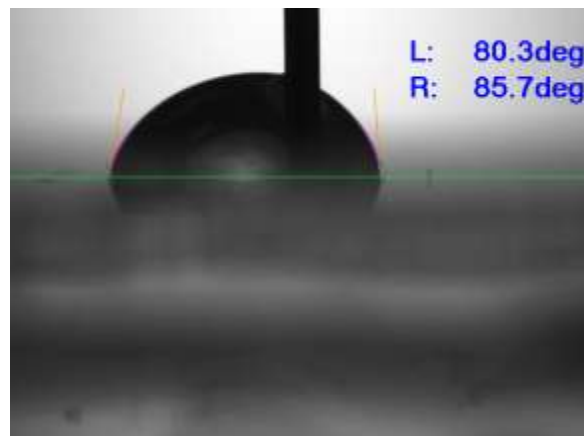


Figure 10. A typical image capture from Test 1 of a water droplet on Coated for receding contact angle analysis; an eclipse fitting analysis routine has been selected.

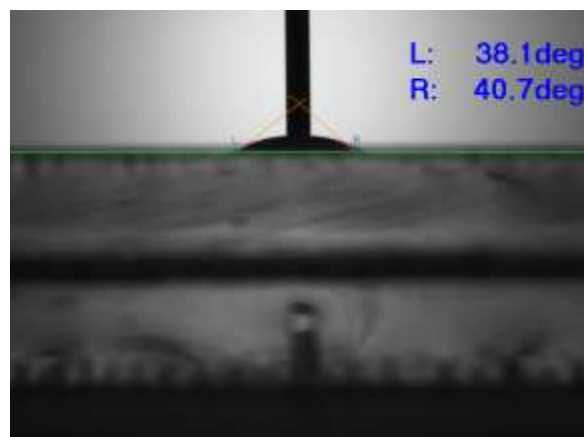


Figure 11. A typical image capture from Test 2 of a water droplet on Uncoated for advancing contact angle analysis; an eclipse fitting analysis routine has been selected.



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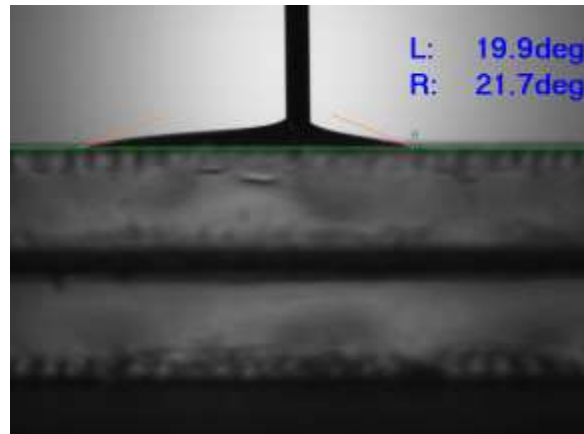


Figure 12. A typical image capture from Test 3 of a water droplet on Uncoated for receding contact angle analysis; an eclipse fitting analysis routine has been selected.