Biolin Scientific
[Progress Together]

Attension | Theta

Complete Range of Optical Tensiometers / Contact Angle Meters

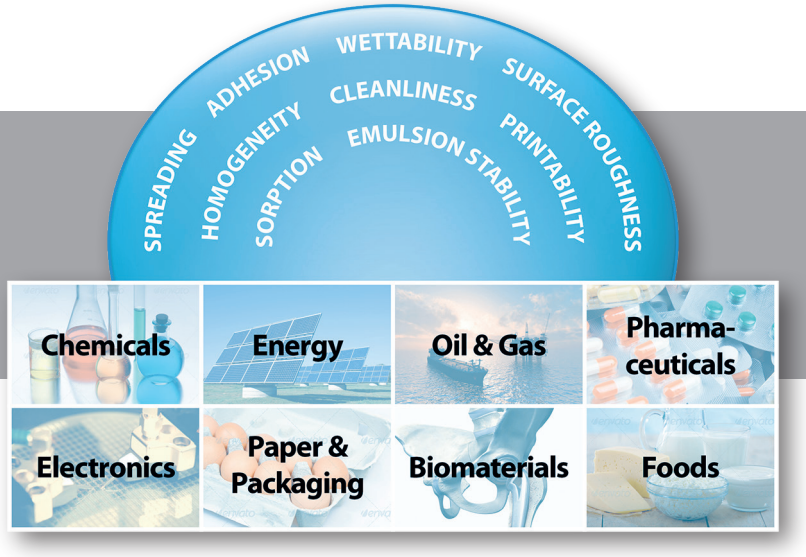
Versatility, automation and accuracy

Precision made simple

Attension Optical Tensiometers are used in research, development and quality control for the study of surfaces and interfaces. They will help you characterize your surfaces easily and precisely, saving you valuable time and money.

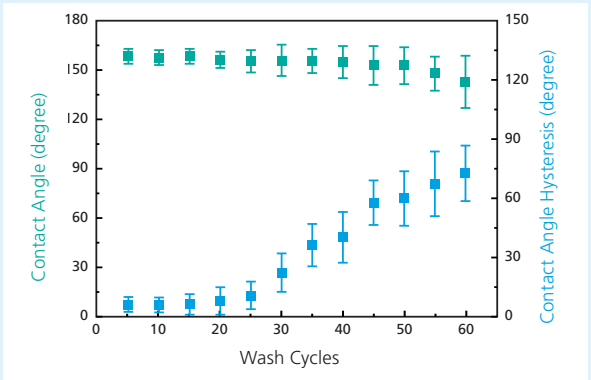
The Attension Optical Tensiometer offering enables a wide range of applications from advanced research to quick quality control. Thanks to the versatility, you can get the combination of features that best fits your needs.

VISUALIZE THE POSSIBILITIES



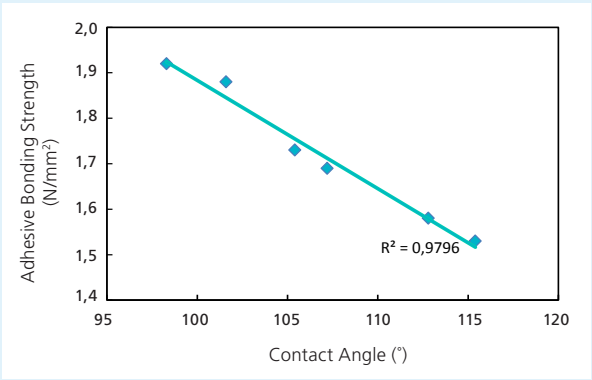
[APPLICATIONS EXAMPLES]

Functional surfaces



Dynamic contact angle measurement giving additional information about the durability of the coating. Ref.: Zhao et al., Langmuir 28, (2012), pp 6328-6335. Adapted with permission from ACS.

Adhesion in composites



Adhesion strength and contact angle correlation for composite development. Data from S. Jarusombuti and N. Ayrilmis, European Journal of Wood and Wood Products, 69 (2011) p 375.

Attension Optical Tensiometers

Measurements

Attension Optical Tensiometers can measure:

- Static contact angle
- Dynamic contact angle
- Surface free energy (SFE)
- Surface tension
- Interfacial tension
- Batch contact angle
- Roughness corrected contact angle
- Interfacial rheology (viscoelasticity)

Measurement methods

Sessile drop
for static contact angle measurement of a liquid droplet

Tilted drop*
for dynamic contact angle measurements

Advancing drop
for dynamic contact angle measurement

Receding drop
for dynamic contact angle measurement

Meniscus
for static contact angle measurement with a fiber/rod

Captive bubble
for static contact angle measurement of a gas bubble

Pendant drop
for surface and interfacial tension

Reverse pendant drop
for surface and interfacial tension

Pulsating drop*
for dilational interfacial rheology measurement

3D Topography*
for roughness corrected contact angle

Batch sessile drop
for static contact angle measurements in quality control

* available only with Theta Optical Tensiometer

Technology

An optical tensiometer records drop images and automatically analyzes the drop shape. The drop shape is a function of the surface tension of the liquid, gravity and the density and humidity difference between sample liquid and surrounding medium. On a solid, the drop shape and the contact angle also depends on the properties of the solid (e.g. surface free energy, topography). The captured image is analyzed with a drop profile fitting method in order to determine contact angle and surface tension. Surface free energy can be calculated by performing contact angle measurements with several known liquids.

As an optical method, the measurement precision of optical tensiometers depends on the quality of the pictures and the analysis software. Attension Optical Tensiometers utilize a high quality monochromatic cold LED light source to minimize undesirable sample evaporation. Image quality is guaranteed by a high-resolution digital camera, quality optics and the accuracy of the drop fitting method.

Theta Optical Tensiometer

Theta is the ultimate Attension contact angle meter enabling full automation and optimal ease of use even for the most demanding industrial and research applications.

Complete range of measurements

- Static contact angle
- Dynamic contact angles
- Surface free energy
- Surface tension
- Interfacial tension
- Batch contact angle
- Roughness corrected contact angle
- Interfacial rheology (viscoelasticity)
- High pressure and high temperature measurements

Full automation

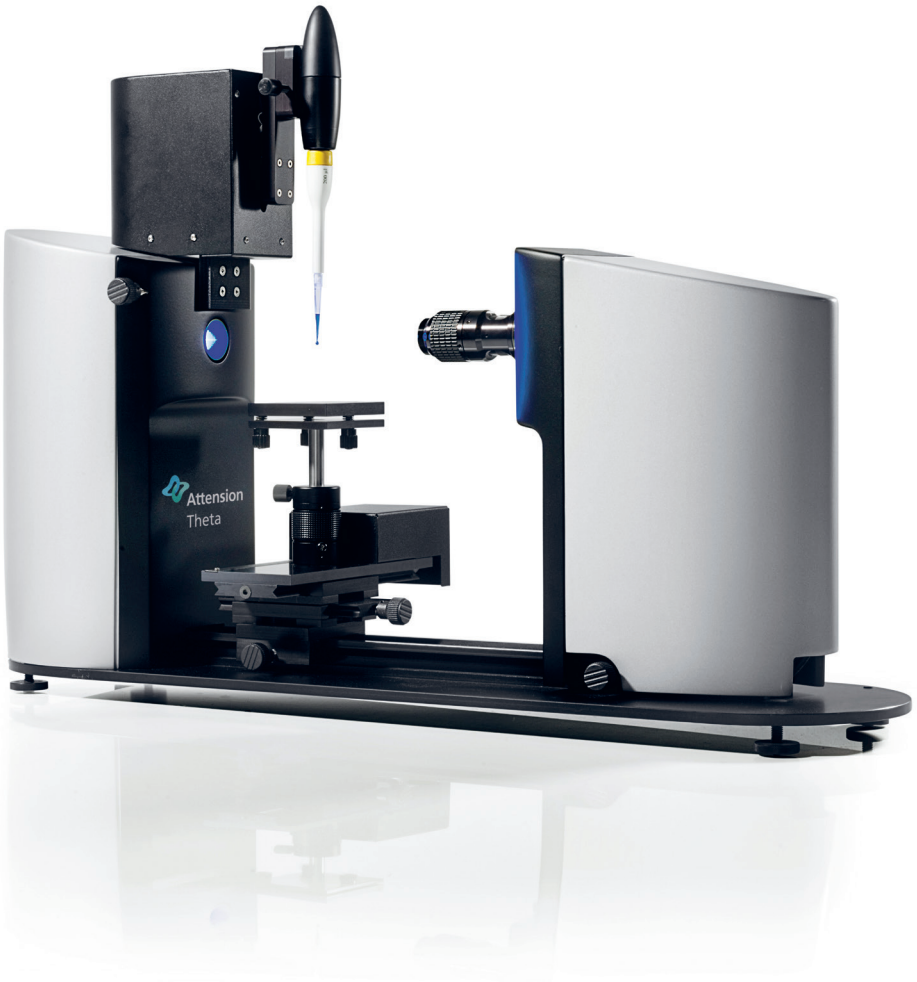
The system can be fully automated, and measurements can be performed easily with a single click.

Versatility and high performance

Theta modularity allows you to choose a system that matches your application precisely – and upgrade it later if needed.

Best-in-class software

OneAttension is an all-inclusive software providing all measurement modes, superior drop shape analysis, continuous drop volume monitoring, live results, and the friendliest user interface available.



Theta Modules and Accessories

Attension Theta enables you to tailor your system as you like. Start by designing your standard system:

Level of Automation

- Motorized or manual sample stage
- Motorized or manual liquid dispenser motion

Liquid Dispensing

- Automatic or manual dispensing
- Single or multi-liquid dispenser

Digital Video Camera

- Standard camera or high-speed camera

Complement your system with the modules and other accessories that are needed for your applications:

3D Topography Module

Roughness-corrected contact angle measurements automatically with a single click. For eliminating the effect of surface roughness for contact angle results.

High Pressure Chamber

Enables measurements at pressures up to 400 bars and temperatures up to 200 °C. Designed for enhanced oil recovery and supercritical fluid applications.

Pulsating Drop Module – PD 200

Oscillates drop volume for interfacial rheology studies.

Picoliter Dispenser

Dispensing of picoliter-sized droplets for small sample areas and inkjet applications.

Tilting Cradle

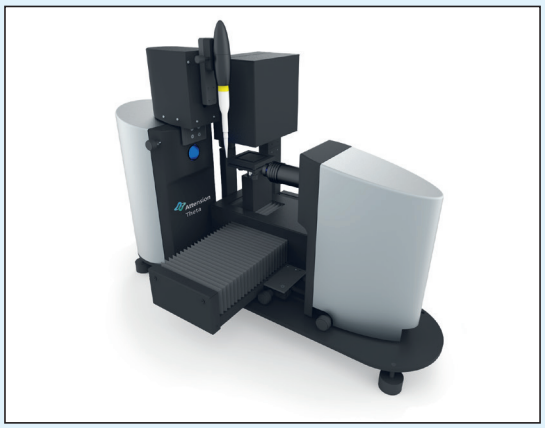
For fully automatic dynamic contact angle measurements by the tilted drop method.

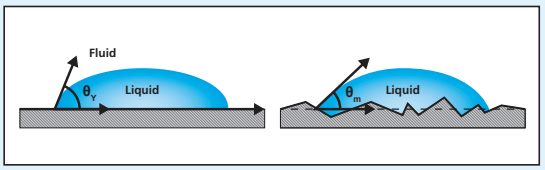
Environmental Chambers

To control the measurement environment including the temperature.

For a complete list of accessories, please visit the Theta product page at www.biolinscientific.com/product/theta.

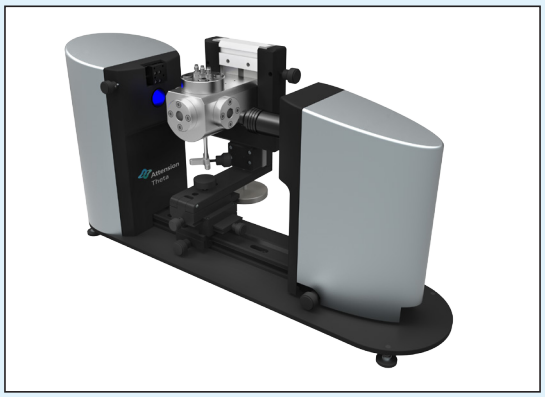
Theta with 3D Topography Module

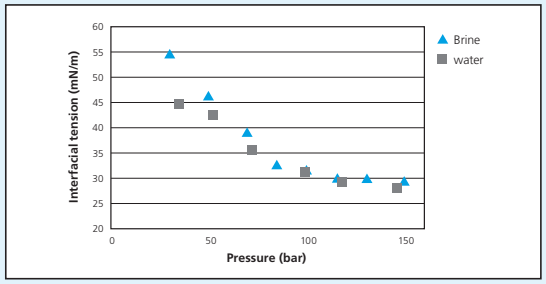




Separate impact from surface chemistry and roughness in coatings and material development. Theta with 3D Topography Module measures them simultaneously in the same spot.

Theta with High Pressure Chamber





Interfacial tensions between brine/CO_2 (triangles) and water/CO_2 (squares) as a function of pressure. Measurements performed by Biolin Scientific.

Theta Lite Optical Tensiometer

Theta Lite is a compact and robust contact angle meter for simple and precise operations. It fully supports you in your research or quality control when automation is not required.

Accurate measurement of

· Static contact angle
· Dynamic contact angles
· Surface free energy
· Surface tension
· Interfacial tension
· Batch contact angle

Best-in-class software

OneAttension is an all-inclusive software providing all measurement modes, superior drop shape analysis, continuous drop volume monitoring, live results, and the friendliest user interface available.

Robustness

Theta Lite shows how even manual tensiometers can offer precise dispensing, deposition, and analysis.

Ease of use

Simple and quick operation – widely utilized in quality control and research.

For a complete accessory description, please visit www.biolinscientific.com/product/theta-lite.

Theta QC Optical Tensiometer

Theta QC is the first fully portable standalone contact angle meter. You can use it to measure static contact angles on environments where standard optical tensiometers are difficult to use: factories, production sites and portable labs.

Full portability – no computer needed

Take Theta QC anywhere without carrying a computer or connecting cables.

Results available immediately

Single click contact angle measurement – results are presented immediately on the device touchscreen.

Designed for industrial QC

Fully portable, compact and light-weight. Easy liquid filling and wireless or cable data transfer to PC.

Simple one-click operation

The effect of operator on the results is minimized by an easy operation – click Measure and read the results!

For additional information on how Theta QC can help in your application, please visit www.biolinscientific.com/attension.

OneAttension software

OneAttension software combines the most intuitive user interface with a high level of functionality. Some of its main features includes:

Best-in-class user interface

The most intuitive user interface is the key for OneAttension. The software is easy to learn, and the logical interface allows even complex measurements to be performed with ease.

Superior analysis accuracy

Subpixel analysis accuracy using the industry-standard Young-Laplace equation, first brought to optical tensiometry by Attension. For the most versatile capability, other methods such as Bashforth-Adams and Polynomial are also included.

Live analysis

The results are shown real-time during the measurement. You can conveniently monitor your results without the need to switch between measurement and analysis tabs.

Full automation

OneAttension supports fully automatic measurements. In order to make your result analysis as convenient and accurate as possible, OneAttension also features automatic baseline detection combined with automatic drop fitting.

Flexibility for every need

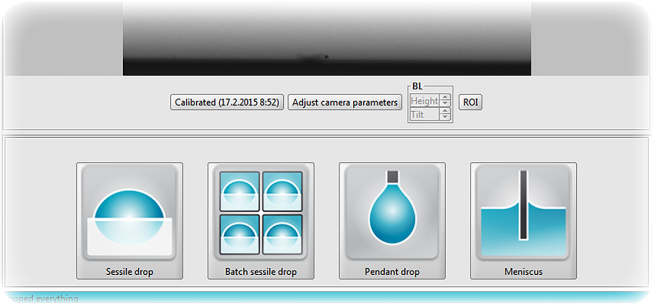
OneAttension has been designed to meet the requirements of almost any applications you may have. You can easily adjust measurement parameters to match your specific application needs. Your optimized measurement recipes can then be saved for further use.

Data handling and exporting made easy

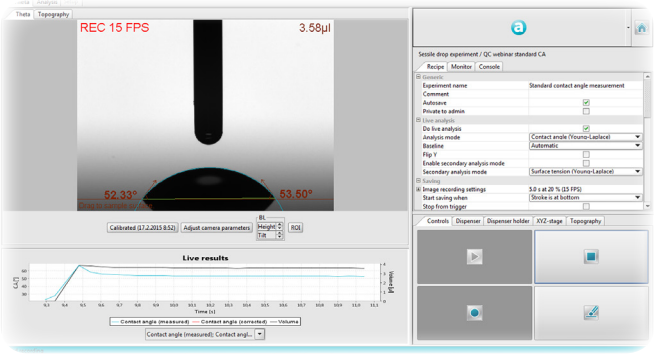
Data analysis, plotting, and statistical analysis can all be done with a few clicks to give you accurate results within seconds. All data can easily be exported further to Excel, for example.

Optimal for industrial use

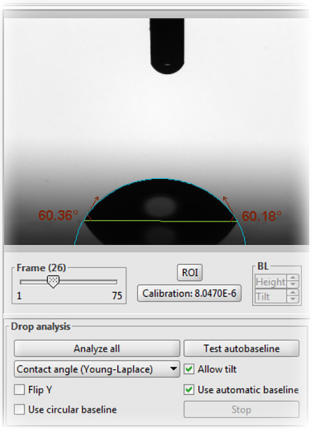
The Batch Sessile Drop measurement makes it simple to measure static contact angle in quality control. Additionally, measurement reports can be created with a few clicks and the user manager conveniently handles all different users – with desired privacy levels.



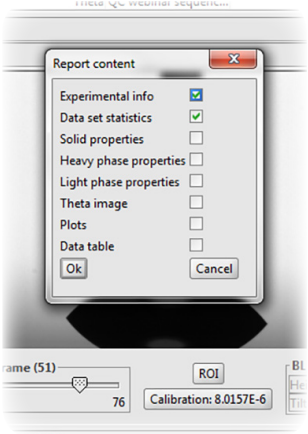
Intuitive interface



Live analysis



Automatic baseline detection



Reporting made simple

[SPECIFICATIONS]

Available Measurements	THETA	THETA LITE	Theta QC
Static contact angle	√	√	√
Dynamic contact angle	automatic	manual	-
Surface/interfacial tension	√	√*	-
Roughness corrected contact angle	√	–	-
Interfacial rheology	√	–	-
Surface free energy	Zisman Plot, OWRK/Extended Fowkes, van Oss Acid-Base, Wu, Neumann's Equation of State, Schultz 1 and 2		-

Available Measurement Methods			
Sessile drop	√	√	√
Batch sessile drop	√	√	-
Captive bubble	√	√	-
Pendant drop	√	√	-
Reverse pendant drop	√	√	-
Meniscus	√	√	-
Dynamic contact angle	automatic	manual	-
Pulsating drop	√	–	-
3D Topography	√	–	-
High pressure	√	–	-

Hardware			
Measuring range (°, mN/m)	0...180, 0.01...1000	0...180, 0.01...1000	0...180
Accuracy (°, mN/m)	± 0.1, ± 0.01	± 0.1, ± 0.01	± 0.1
Maximum sample size (mm)	UNLIMITED * 95 * 180 (w. stage)	UNLIMITED * 50 * 200 (w. stage)	UNLIMITED
Frame interval	0.33 ms ... 1000 s	6 ms...1000 s	-
Maximum resolution (pixels)	1984 * 1264	744 * 480	752 * 480
Maximum measuring speed (fps)	3009	160	-
Camera	USB3 digital camera	USB2 digital camera	digital camera
Light source	LED based background lighting	LED based background lighting	LED based backgr. lighting
Field of view (diagonal in mm)	1.44...30	3.5...7.5	5.35
Dimensions (basic frame) (mm)	H 590 * W 200 * L 740	H 310 * W 130 * L 495	H 152 * W 125 * L 119
Weight (basic frame) (kg)	7.3	5	1.3
Power supply (vac)	100...240	100...240	100...240 (3.7)
Frequency (Hz)	50...60	50...60	50...60

Drop Profile Fitting Method			
Young-Laplace (CA, ST/IT, M)	√	√	√
Bashforth-Adams (ST/IT)	√	√	-
Circular (CA)	√	√	-
Polynomial (CA, M)	√	√	-

Software			
Provided Software	OneAttension	OneAttension	Data transfer

System requirements	
Recommended system requirements**	2 GHz processor, 2 GB RAM, 120 GB hard disk drive[1], 1024 * 768 resolution, 1 USB2 or USB3 port, 1 additional USB3 port required with Theta, 1 additional USB2 port required with 3D Topography Module [1]SDD hard disk (min. 500 MB/s) needed for high speed recording with Theta
Operating system requirements**	Windows 7 & 8 & 10 (32 or 64 bit)

Ver. 2016-04-18

All specifications are subject to change without notice.

√ : available – : not available/not applicable
CA: contact angle ST/IT: surface tension and interfacial tension M: meniscus
*: With extended license
**: Only for Theta and Theta LIte

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About Us

Biolin Scientific is a leading Nordic instrumentation company with roots in Sweden, Denmark and Finland. Our customers include companies working with pharmaceuticals, energy, chemicals, and advanced materials, as well as academic and governmental research institutes. Our precision instruments help discover better drugs faster, develop better solutions for energy and materials, and perform research at the frontiers of science and technology.