Kino

# SL200P

## Portable Optical Contact Angle Meter & Interfacial Tensiometer

*– Interface Chemical Analytical System Based on Drop Shape Analysis*

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## Portable Optical Contact Angle Meter & Interfacial Tensiometer

– Interface Chemical Analytical System
Based on Drop Shape Analysis

Patent No. CN 201120310388.7


SL200P is designed for measurements:

–Very large sample, e.g. large LCD, solar substrate, surface of table;

–Uncuttable sample, e.g. bumper, car body, bath and water tap;

–Inner wall of special chamber and vertical surface of sample, e.g. wall;

–Environment of outdoor, assembly line, and on–site measurement, e.g. oil recovery, construction site of road, printing, wafer and more.

The integral instrument consists of sophisticated optical mechanism, optical vision system, high–precision dosing system as well as CAST®3.0–USA KINO's professional interfacial chemical analytical software. SL200P are applicable of measuring of static / dynamic contact angle, surface free energy of solid and its distribution (dispersive force, polar force and hydrogen bond force, etc.), interface tension of liquid–gas / liquid–liquid, etc. We provide clients cost–effective instruments with best performance – the most professional contact angle meter & interfacial tensiometer and technical assurance in R&D and quality control.

$$\sigma_{SV} = \sigma_{SL} + \sigma_{LV} \cdot \cos\theta$$

$$\sigma \cdot \left\{ \frac{1}{R_1} + \frac{1}{R_2} \right\} = \sigma \cdot \left\{ \frac{\sin\phi}{X} + \frac{1}{R_1} \right\}$$

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## What's Contact Angle?

Contact angle, θ , is defined as the angle between tangent of gas–liquid interface and that of solid–liquid interface formed at the three phases' boundary where liquid, vapor and solid intersect.

## Fields of Application

- Surfactant, soap & detergent
- Emulsion
- Analysis of polymer and surface modification
- Pharmaceutical, e.g. wettability analysis of artificial bone
- Spray, painting & coating
- Paper, film & ink
- Cosmetic
- Hydrophilicity contact angle determination of air conditioner's aluminum foil
- Wettability analysis of rock core, coal mine stone and electrical insulator
- Wettability analysis of polaroid, film and wafer surface
- Hydrophilicity and hydrophobicity transformation by UV irradiation
- Analysis of hydrophilicity and hydrophobicity of fabric
- Food industry
- Effect analysis of surface treatment
- Cleanness analysis
- Stability analysis of emulsion & foam
- Adsorption and competition of surfactant, protein & polymer
- Characterization of interface rheological properties
- Surface cleanness analysis of PCB, chips (wafer), LCD/LED and high precision machinery elements
- Wetting analysis of carbon fiber, glass fiber and resin
- Electro–wetting transformation and the relevant change of its contact angle

## International norms and standards

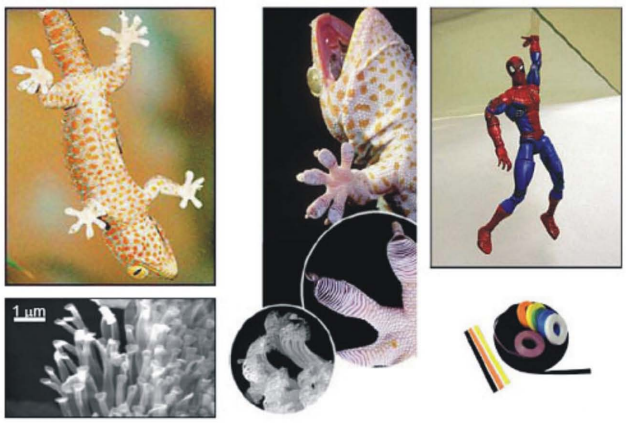
ASTM D 724: Standard Test Method for Surface Wettability of Paper (Angle–of–Contact Method)

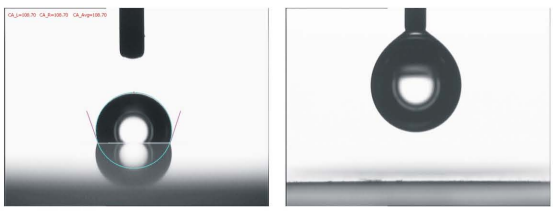
ASTM D 5946–2004: Standard Test Method for Corona–Treated Polymer Films Using Water Contact Angle Measurements

ISO15989: Plastics– Film and Sheeting – Measurement of Water – Contact Angle of Corona–Treated Films

## Performance Features

SL200P, portable and easy to operate, is designed for special or on–site measurements. It's extensively used for its portable.



$$\sigma\cdot\left\{\frac{1}{R_1}+\frac{1}{R_2}\right\}=\sigma\cdot\left\{\frac{\sin\phi}{X}+\frac{1}{R_1}\right\}$$

## Portable, comfortable and easy to operate

1.One hand is enough to hold this 1000g weight portable instrument

2.Ergonomical and integral designed instrument is made of aluminum alloy, which is durable and sturdy

3.Real portable design: USB 2.0 as interface for power supply and communication

## More professional and comfortable design of mechanism

1.Unique mechanism of fixed focal distance and high–precision adjustable positioning stage, with easier and more accurate focal distance obtaining and clearer image shape.

2.Patented optical structure with larger application fields of contact angle measurement.

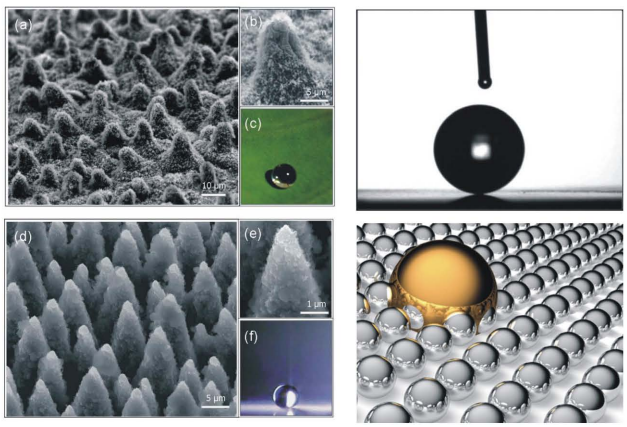
3.Soft light plate made of frosted quartz glass achieves clearer, sharper and softer background light and better drop shape.

4.Unique design of the syringe replaceable direct dosing system makes it easy to hold KINO's OEM syringe made of glass or special syringe with PTFE needle, ultra–thin needle (OD:0.23mm) for measuring hydrophobic materials and syringe measuring medium / high viscosity sample.

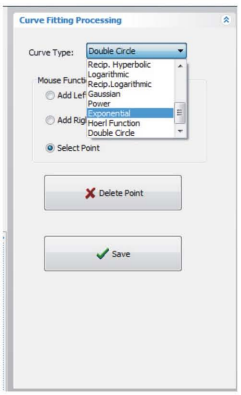
## Sharper edge and high–speed optical vision system

1.Illumination–adjustable cold LED light source technology with sharper and clearer drop contour profile shape, effectively avoiding drop evaporation caused by excessive heat.

2.Higher quality camera with speed of 87–340FPS made in Germany (standard WVGA format). (Optional with cameras of 130M, 300M, 500M)




## Interface chemical analytical system (ADSA™) CAST® 3.0 with more functionalities and more comfortable user interface




1.Five drop shape states for analysis:

Sessile drop (liquid/gas, liquid/liquid/gas), pendant drop, captive drop and tilted plate

2.Seven methods to calculate contact angle and nearly 20 kinds of curve–fitting technologies:

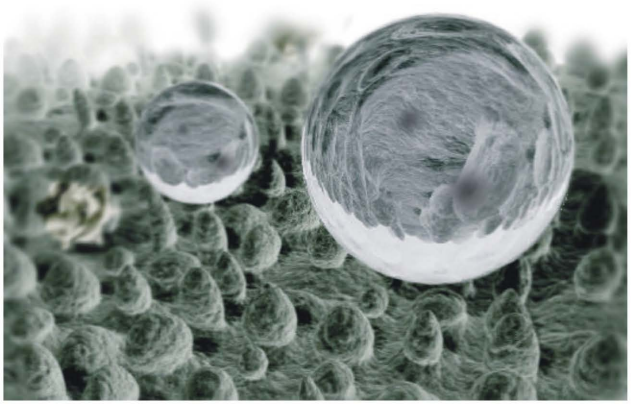
(1)Exclusive methods of θ /2, circle fitting, ellipse fitting, RealDrop™, spline curve–fitting, Young–Laplace equation fitting, curve ruler (tangent method);

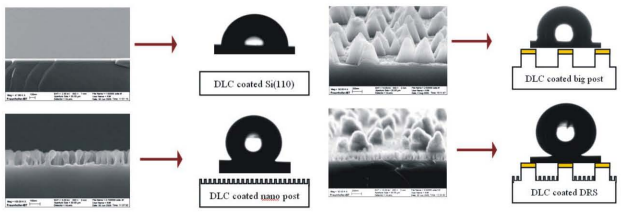
(2)Dynamic / static contact angle measurement

(3)20 exclusive curve ruler methods, such as circle, spline, Gaussian and Power, enable you to analyze:

–Advancing / receding contact angle

–Irregular angle



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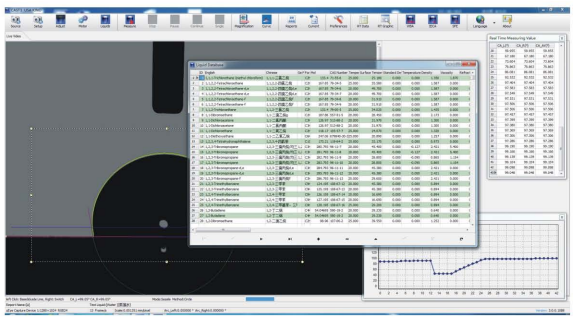
$$\sigma_{SV}=\sigma_{SL}+\sigma_{LV}\cdot\cos\theta$$

3.Twelve surface free energy calculating models, providing you more options to estimate surface free energy and its distributions.

Exclusively provided 12 methods for estimating surface free energy, e.g. Equation of State (Neumann et al.), Good–Girifalco, Owen–Wendt–Rabel, Simple Fowkes, Extended Fowkes, WU method 1–2, Schultz method 1–2, Acid–base (Van OSS & Good), Jhu, and Zizman Plot (critical surface tension) method, can be used to measure surface free energy and its distribution (dispersive force, polar force and hydrogen bond value, and Lewis acid–base, etc.) of low/high energy solid surface.

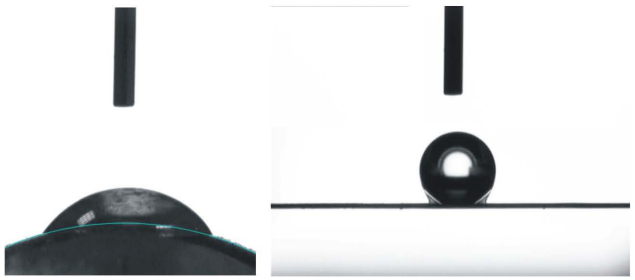
4.300 kinds of liquids with 800 data values of liquid surface tension and its contribution as reference data or for faster analysis of surface free energy of solid.



5.Unique interfacial tensiometer of liquid–gas / liquid–liquid with Young–Laplace equation fitting method based on Bashford–Adams table and Realdrop™, used for oscillating drop tests, surface tension measurement of medium to high viscosity sample, dynamic surface / interface tension measurement of surfactant, and oscillating & expanding drop measurement (corresponding modules are required).

6.Unique curve base line correction technology for measurement of contact angle of lower concave / upper convex.

Exclusive curve base line based circle– fitting or curve–fitting of unilateral arbitrary curve shapes with easier operation and more accurate result.



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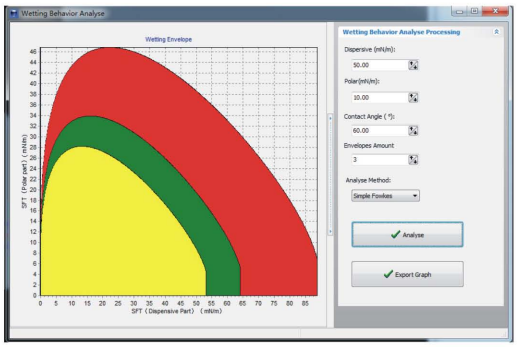
7.Rod, thread and tilted plate method based interface tension and contact angle measurement for analysis of contact angle of single fiber. (Need to choose and buy related accessories)

8.Dual–software triggering technology for analysis of complicated dynamic / static contact angles.

Unique dual–software triggering technology of CAST®3.0 can not only be applied to measure static contact angle but also advancing / receding contact angle, roll off angle, time–dependent (standard speed is 25 FPS, and camera with higher speed are optional) contact angle and zero–time contact angle of ultra–water absorption material ( e.g. powder, fibers, paper, and artificial periosteum). It is applied more extensively with better measured result.

9.Unique technology of wetting behavior analysis (WBA / wetting envelopes).

A 2D map of wetting envelope can be constructed by using the contributions of surface free energy and corresponding method (such as OWEN), and a plot produces to show how wettability occurs. It is another way of understanding contact angle, hence degree of wetting, arise from an understanding of the forces existing in material and between the materials.




Wetting behavior analysis of low–energy solid material

10.More comfortable software user interface:

(1)New–generation wizard UI. Our software will implement measuring contact angle, surface free energy automatically at the touch of a finger according to wizard UI. Besides, with our 140–page user manual, you can operate the instrument easily without any professional training.

(2)Unicode based software interface. Its English user interface can easily be changed to other language (such as Simplified–Chinese), and makes it more convenient to operate.

11.Fully automatic analysis of contact angle, adhesive work and surface free energy:

(1)Fully automatic. Just press "Measure", images capture, contact angles calculation, data storage and real–time display measured value will be done without manual intervention.

(2)Manual modification function. Double–click "Modification", you can modify measured values by captured image, and software saves the record of operation traces conveniently to avoid errors of automatic measured value.

(3)Real–time graph. Left / right contact angle, average contact angle, adhesive work, surface free energy used equation of state method can be real–time displayed without extra calculation.

12.Powerful database management for convenient storage, query, and exporting data:

(1)Access database technology provides you more powerful functions

(2)Real–time saving and indexing of measured value

(3)One–to–one correspondence between measured data and image; corresponding drop image is automatically displayed when the data is selected

(4)Historical data query

(5)Modification of historical data

(6)Importing and backup of historical data

(7)Database compression

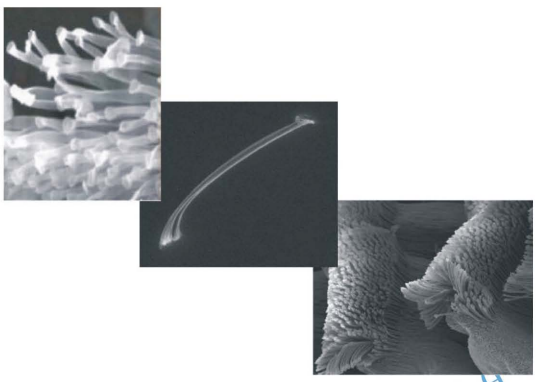
13.Measured data exportable.

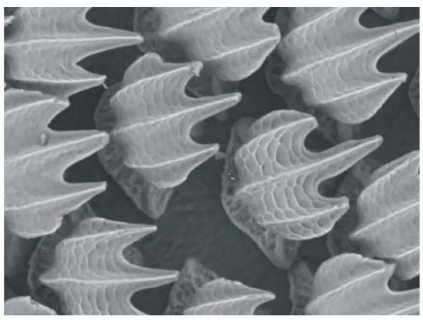
All measured data can be exported into Excel file and image file into BMP file, which can be easily imported into scientific article and testing report.

14.Standardized windows® technology based video capture technology with better compatibility.

The standardized design of video capture method used the windows multimedia technology enables the compatibility of various contact angle meters around the world. Just enjoy the convenience brought by CAST® 3.0.

15.Unique video recording function. Measurement process can be recorded into AVI format for later use.





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# Technical Parameters

"*" marks the major differences between variants.

| | SL200P | |
|---|---|---|
| Appearance |  | |
| Subject | SL200P1, manual | SL200P2, automatic |
| Measuring Range of Contact Angle | 3 – 180° | |
| Resolution | 0.01° | |
| Accuracy | ± 1° （θ /2 method)/ ± 0.1° （circle fitting） | |
| Measuring Range of Interface Tension | 0 – 1000mN/m | |
| Resolution | 0.001mN/m | |
| Methods of Interface Tension | BA table, Young–Laplace equation fitting (ADSA™) | |
| Calculation Method of Contact Angle | 7 methods, including θ /2 (WH), circle fitting , ellipse fitting , RealDrop™ , curve ruler (tangent fitting ), spline curve–fitting , and Young–Laplace equation fitting (ADSA™), etc. | |
| Evaluation Models for Surface Free Energy | Exclusively providing 12 methods for calculating surface free energy, e.g. Equation of State (Neumann et al.), Good–Girifalco, Owen–Wendt–Rabel, Simple Fowkes, Extended Fowkes, WU method 1–2, Schultz method 1–2, Acid–base (Van OSS & Good), Jhu, and Zizman Plot (critical surface tension) method, for measurement of surface free energy and its distribution (dispersive force, polar force and hydrogen bond value, and Lewis acid–base, etc.) of low/high free energy solid. | |
| Dosing System | *Manual micro syringe pump | *Auto micro syringe pump |
| Micro Dosing System | Micro dosing system of 100uL made of glass with replaceable needles | |
| Dosing Accuracy | 0.1μL | 0.01μL |
| Needle | Needle with OD of 0.5mm or 0.3mm, PTFE, plastic and more | |
| Drop Transferring Method | *Manual | *Automatic |
| Vision System | WVGA video camera with speed of 87–340 frame/second and communication interface of USB2.0 | |
| Background Light | Illumination–adjustable cold LED light source | |
| Software | CAST® 3.0 enables professional database management with data backup and embedded liquid database | |
| Dimension | 120（L）×50(D)×120(H) mm | 150(L)×60(D)×150(H) mm |
| Weight | 1100g | 1200g |
| Power Supply | Power supply of 500mA via USB2.0 | |

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State of the art interface chemical analytical instruments from USA KINO provide you professional solutions. For more information, please visit
http:// www.uskino.com  www.kinochina.com

Kino

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