BP-D5

Automatic Dynamic Surface Tensiometer (Bubble Pressure Method)

Why dynamic surface tension is required?

"Surface tension properly low, but during the actual coating process, the wetting result was insufficient." Have you ever faced this dilemma?
For instance, coating agents generally include surfactants to control their wettability to materials by lowering surface tension, and the surfactants can adsorb toward the solution surface gradually, changing the surface tension of the solution over time. Thus, surface tension has to be studied in the function of time if the target solutions include surfactants.
The widely-known Wilhelmy plate method and du Nouy ring method measure surface tension under conditions in which the surfactant adsorbing has equilibrated, called Static Surface Tension. But coating solutions are in constant change, with surfactants continually adsorbing to new surface and bulking up as micelle. In such conditions, the speed at which surface tension drops, via the time function Dynamic Surface Tension, becomes important. The BP-D5 allows measuring Dynamic Surface Tension with its Bubble Pressure technique.

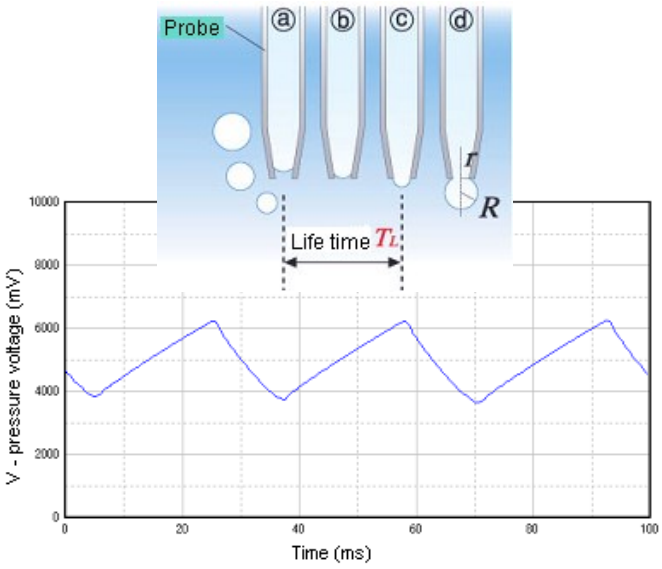
Functions

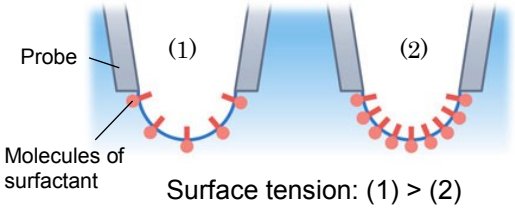
- Lifetime*1 can be changed automatically to draw variations over time in a single process.
- Real time display of the bubble pressure waveform for monitoring of bubble generation.*2
- One-touch adjustment of the probe's immersion depth and starting measurement.

*1: Refer to the explanation of Lifetime in next page.
*2: Stability of bubble generation is important for accurate measurement, which the waveform can show.

Measurement Principle

When pressurized air is flown through a capillary constantly, the pressure inside the capillary changes in a regular cycle → (a) ~ (d).
When the curvature radius of bubble ***R*** equals the radius of capillary outlet ***r***, the pressure will reach a maximum. → (c)
Then, go down. → (d)
The bubble pressure method measures the maximum pressure and converts it into surface tension. The cycle (a) to (c) is Lifetime and quantity of surfactants adsorbed on the bubble surface during this cycle affects surface tension.

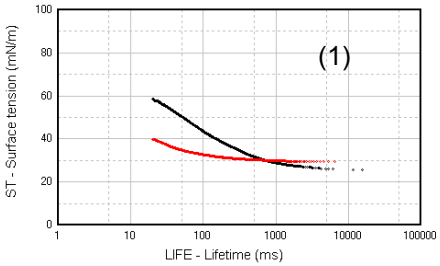


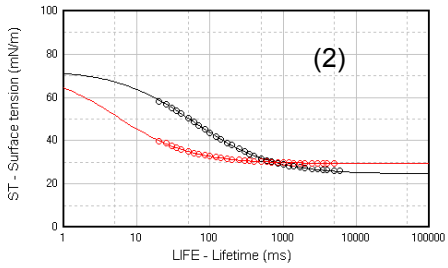


Surface tension: (1) > (2)

Software Performances

- Real time graphing of the measurement result. → (1)
- Applying Rosen*1 fitting to the measured results and presents the maximum slope of graph. → (2)
- Draws up to 11 data samples on a single sheet for comparison.
- Data is saved by CSV format.





Applications

- Surfactant: Study of fundamental property
- Ink, Coating agent: instantaneous wettability
- Fountain solution in offset printing: adsorbing speed of surfactant
- Aerosol, Emulsion: instantaneous generation of small droplet
- Detergent, Extinguishant: Initial foaming

Specifications

Measurement method	Maximum bubble pressure
Measurement range	Surface tension: 10 - 100 mN/m, Lifetime: 20 - 5000ms (Fixing mode: 20 – 1000ms)
Resolution	Surface tension: 0.01mN/m, Lifetime: 0.1ms
Repeatability	0.5mN/m (standard deviation based on manufacturer's standard)
Measurement temp	10 - 70°C (option by hot/cold water circulator 4VT)
Sample volume	About 80mL (exclusive lab dish is used.)
Sample viscosity	0.5 - 10mPa･s
Dimensions, weight	320(W) x 315(D) x 475(H) mm, 18.5 kg (main body only)
Utilities	AC100 - 240V, 50/60Hz, 50W, 80VA, Pressurized dry air 0.4～0.7Mpa

* The specifications and designs are subject to change without notice.

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