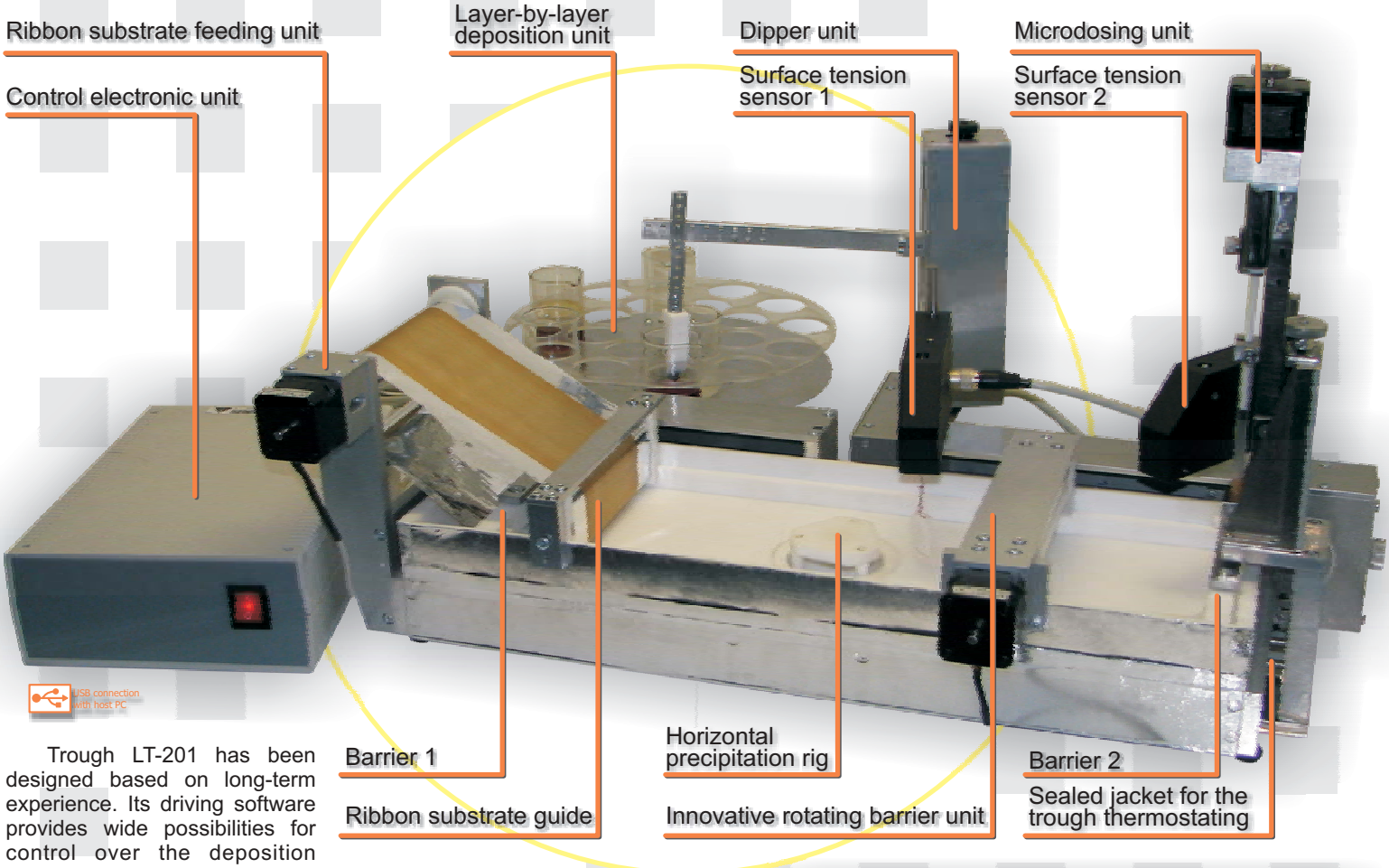
Langmuir–Blodgett Trough LT-201

Langmuir–Blodgett trough LT-201 is intended for application of monomolecular films on solid samples according to the Langmuir-Blodgett (LB) technique or to the horizontal precipitation (HP) technique; deposition of multimolecular films using corresponding layer-by-layer technique; formation of mono- and multimolecular composite coatings on solid surfaces; modification of the surface properties (hydrophilic behavior, optical, electrical properties etc.); conducting fundamental research at ultrathin film fabrication and their use as insulating and protective coatings, molecular electronic elements, in biology for creation of bilayer lipid membranes etc.

Thin organic films (monomolecular layers) are the source of high expectations in the development of such promising devices as sensors, detectors, displays, electronic circuit components etc. The possibility to synthesize organic molecules, almost without limitations, with desired structure, properties and functionality in combination with advanced thin film deposition technologies enables the production of electrically, optically and biologically active components on a nanometer scale.

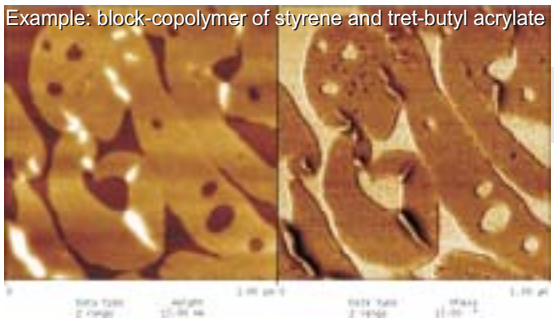
An organic thin film can be deposited on a solid substrate by various techniques. Langmuir-Blodgett (LB) technique is one of the most promising techniques for preparing such thin films.

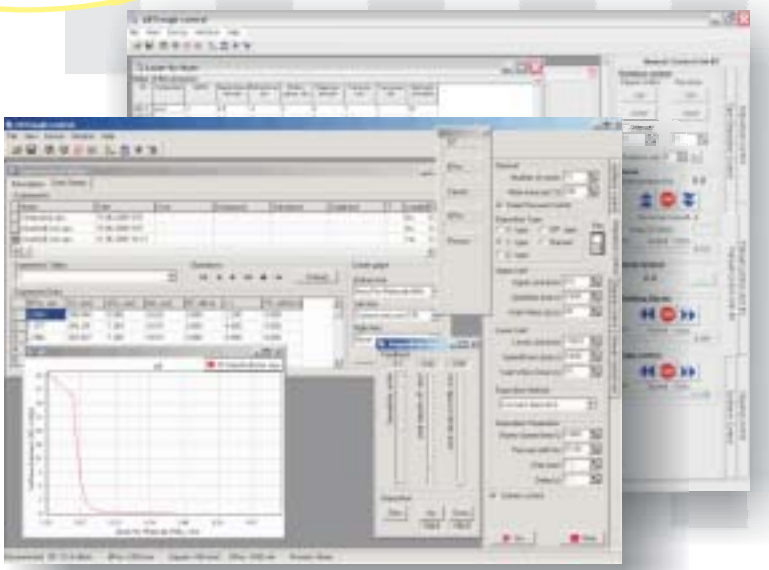


Trough LT-201 has been designed based on long-term experience. Its driving software provides wide possibilities for control over the deposition processes as well as for the received data analysis.

The driving software is built according to the modular scheme oriented to perform specific application techniques. It provides all preliminary settings and calibration necessary for the LB trough operation as well as control over the systems at the deposition. Use of scripts allows to automate various routines. The driving software allows construction of films composed of unlimited number of components.

LB trough LT-201 requires small volume of a liquid (aqueous subphase), allows to construct high quality and homogeneity films over big areas, and includes a set of useful accessories. For example, innovative rotating barrier enables deposition of LB film on a ribbon substrate of practically unlimited length.


Example: block-copolymer of styrene and tret-butyl acrylate



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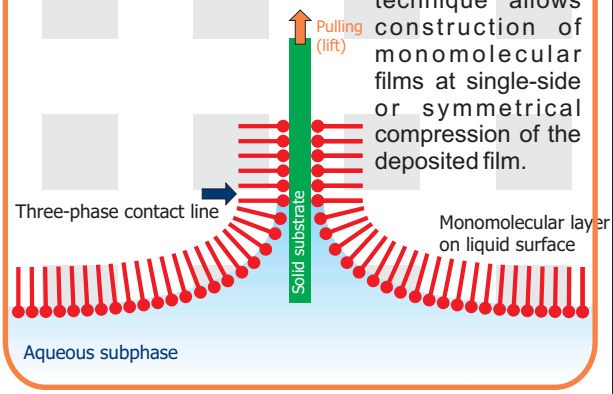
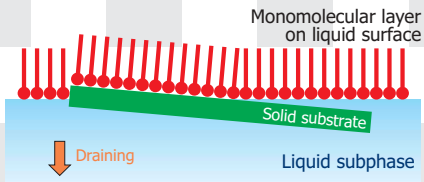
Langmuir–Blodgett Trough LT-201

LB FILM DEPOSITION (Z-TYPE)

Traditional LB technique allows construction of monomolecular films at single-side or symmetrical compression of the deposited film.



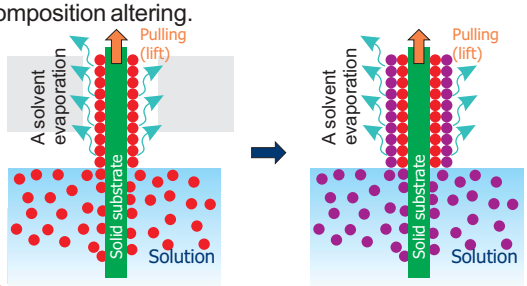
HORIZONTAL PRECIPITATION METHOD



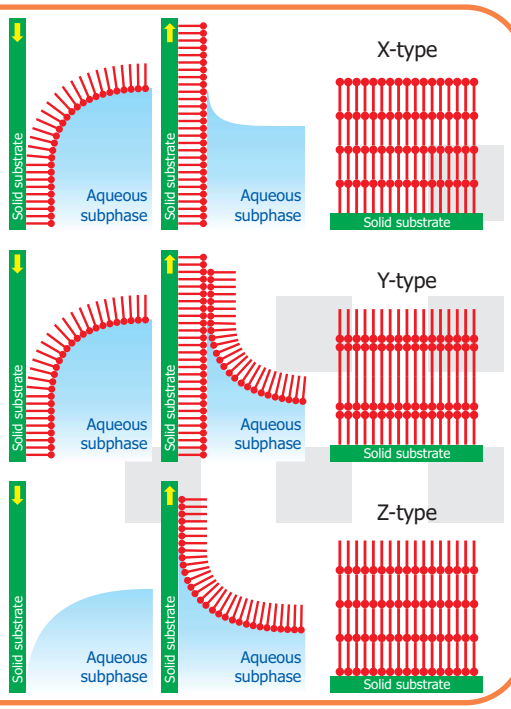
Horizontal precipitation (HP, in contrast to traditional vertical LB) technique enables deposition of highly uniform and homogenous films of a wide spectrum of surfactants both in 'solid' and 'liquid-stretched' states independently of the surfactant's end group polarity on horizontal surfaces. HP process is extremely simple and fast especially at modification of big areas.

LAYER-BY-LAYER DEPOSITION

Simple and effective method for deposition of traditional coatings with possibility of each layer composition altering.

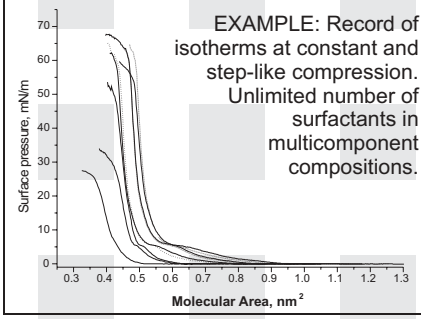


TYPES OF DEPOSITED LB-FILMS



SPECIFICATION

Full free surface area:	800 cm^2
Maximum free surface area confined with the barrier:	744 cm^2
Compressed (effective) area:	560 cm^2
Liquid medium volume:	2000–2100 cm^3
Dipping well:	75 mm deep, diam. 60 mm
Maximum dimensions of the immersed substrate:	70x55x4 mm (h-w-t)
Number of barriers:	Two
Velocity range of the barrier motion:	- single side compression – 0.01 to 180 mm/min - symmetrical compression – 0.02 to 360 mm/min
Dipper mechanism stroke:	85 mm (vertical position of the unit can be adjusted manually)
Dipper mechanism velocity range:	0.01–40 mm/min,
Step of the dipper mechanism velocity change:	0.1 mm/min
Possibility of altering different monomolecular layers deposition:	Available
Delay between the layers deposition:	0–100000 s
Surface tension sensor:	Wilhelmy plate (vertical position of the sensor can be adjusted manually)
Working range of the surface tension sensor:	0.01–80 mN/m (stepped and fine adjustment of the range are available)
Sensitivity of the surface tension sensor:	0.01 mN/m
Number of surface tension sensors:	Two
Unit for substance layer-by-layer self-assembling from solutions:	- number of vessels – 23 (holes diam. 42 mm) - number of application cycles – unlimited - the vessel cassette feed velocisty – 2.2 rev/min
Doser for substance feed to aqueous surface:	- substance reserve – 1 ml - motion range of leading rod – 0-40 mm
Overall dimensions:	Trough with mounted rig - 800x300x520 mm (w-d-h). Control unit - 185x240x105 mm (w-d-h). Weight 14 kg.
Supply voltage:	220 V 50 Hz
Power consumption:	Not more than 100 W
Additional accessories:	- Substrate clamping holder for fixing the sample on the dipper lever. - Rig for film application by the horizontal precipitation method (by liquid medium draining). - Rotating barrier for substance film transfer into the working zone. - A unit for ribbon substrate winding with two guides. - A microdoser for substance feed on water surface. - PTFE inserts for reduction of the working fluid volume. - A jacket for for liquid thermostating of the trough in range 0°C...60°C by outer facilities.



EXAMPLE: Record of isotherms at constant and step-like compression. Unlimited number of surfactants in multicomponent compositions.

Langmuir—Blodgett trough LT-201 has been designed in cooperation with Institute for Chemistry of New Materials of National Academy of Sciences of Belarus (Minsk, Belarus) and A. V. Lykov Heat and Mass Transfer Institute of National Academy of Sciences of Belarus (Minsk, Belarus) in the framework of State Scientific and Technical Program 'Standards and Research Instruments'.

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