



WARSTWY LANGMUIRA – BLODGETTA WŁAŚCIWOŚCI .WYTWARZANIE

Molekularne Ciało Stałe

Paweł Płończak

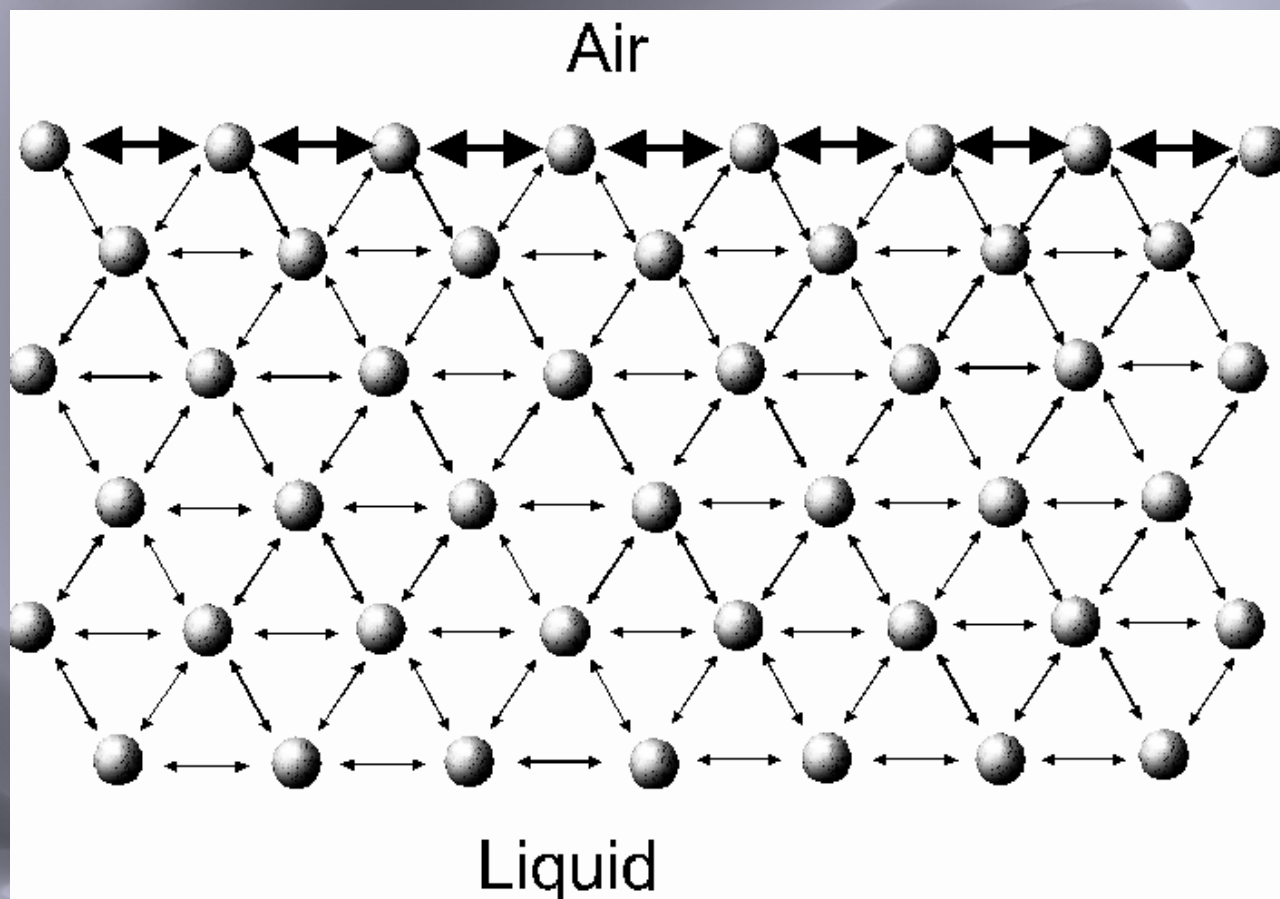
Doza Historii

Katherine Blodgett (1898-1979)



Irving Langmuir (1881-1957)
Nagroda nobla w 1932r. w dziedzinie chemii.

Napięcie powierzchniowe



Środki powierzchniowo czynne

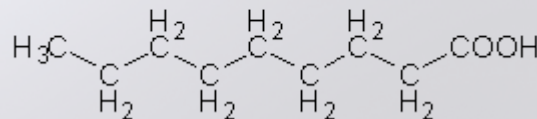
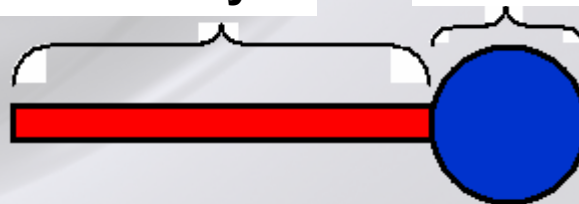
Sufractant – Surface activ agents

Składają się dużej mierze z :

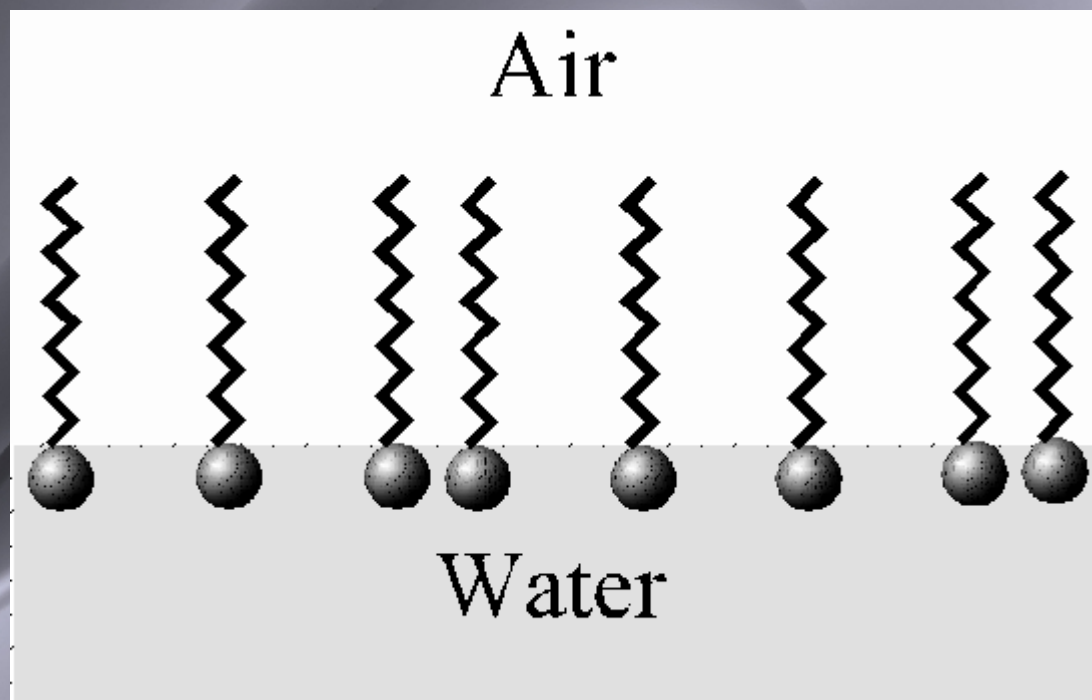
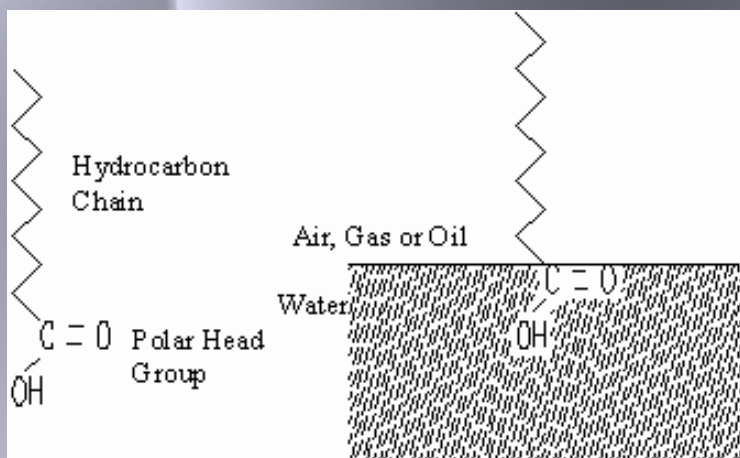
- część hydrofilowa - składają się z grup polarnych
-OH , -COOH , -NH₃⁺ , -PO₄-(CH₂)₂NH₃⁺ , itp.
- część hydrofobowa – najczęściej zawierająca węglowodory albo fluoropochodne węglowodorów

Ogonek
hydrofobowy

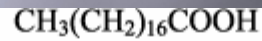
Główka hydrofilowa



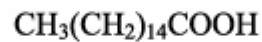
Ułożenie molekuł na granicy woda/powietrze



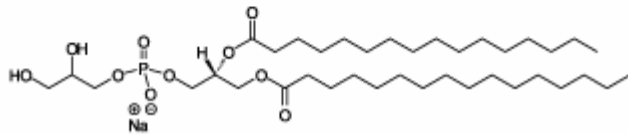
Przykładowe substancje



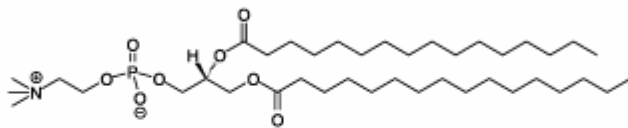
(1)



(2)



(3)



(4)

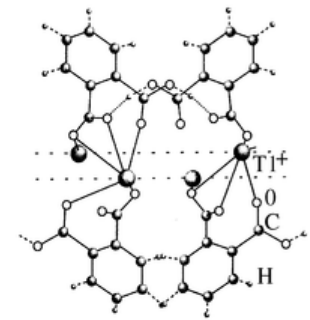
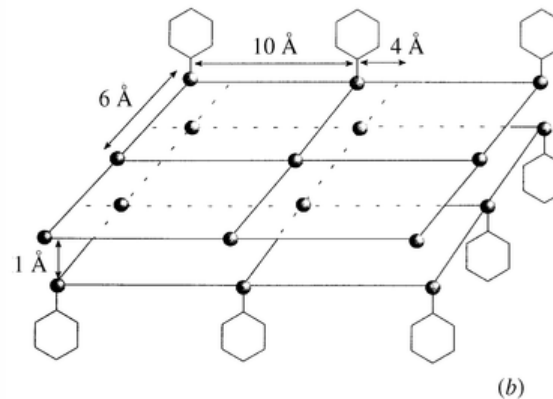
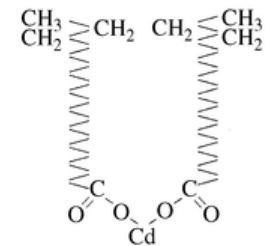
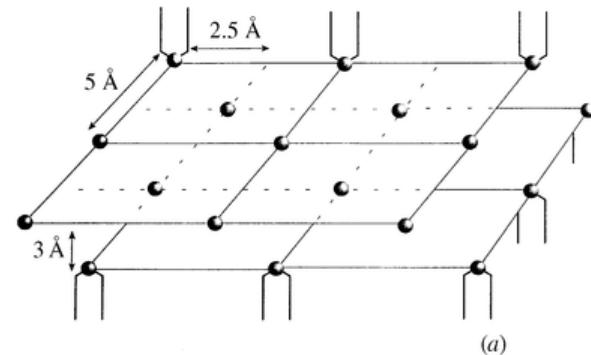
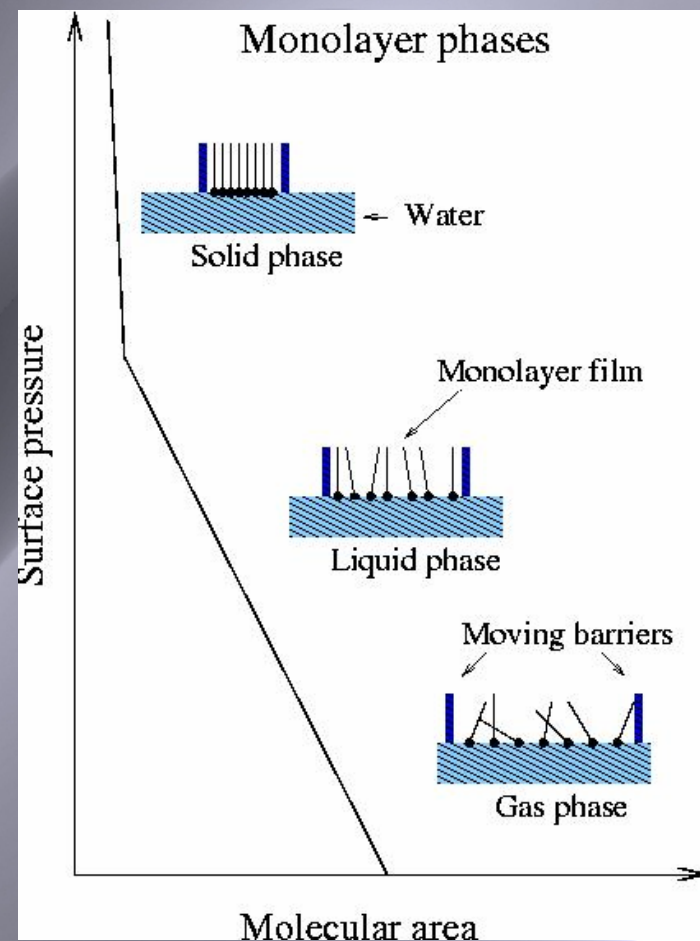
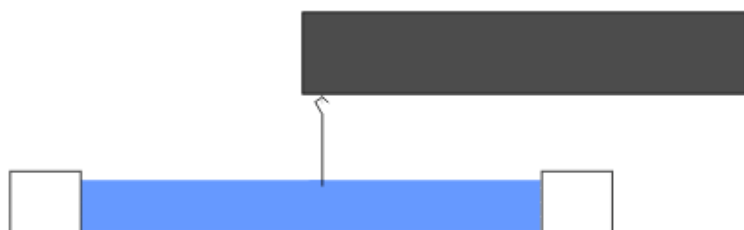
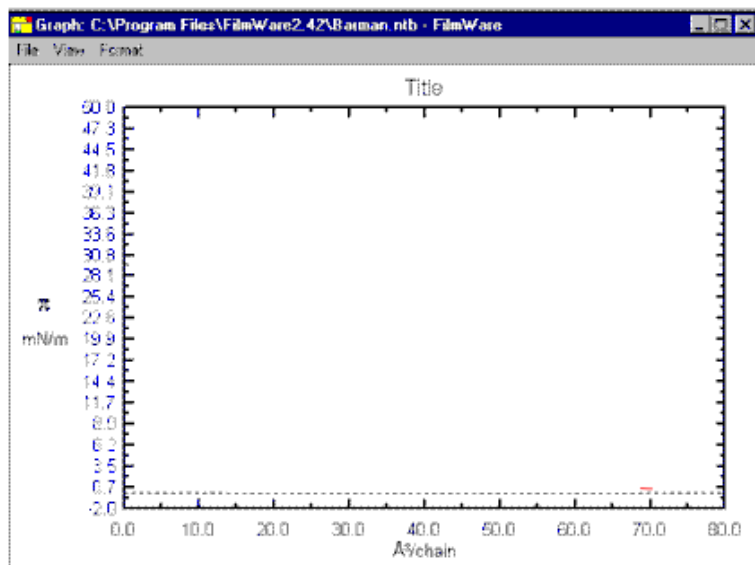


Figura 1. Alguns compostos anfifílicos: ácido esteárico (1), ácido palmítico (2), 1,2-dipalmitoil-sn-glicero-3-[fosfatidil-rac-(1-glicerol)] (sal de sódio) (DPPG) (3), 1,2-dipalmitoil-sn-glicero-3-fosfatidil colina (4) (DPPC)

Wzrost naprężeń powierzchniowych



Wzrost naprężeń powierzchniowych

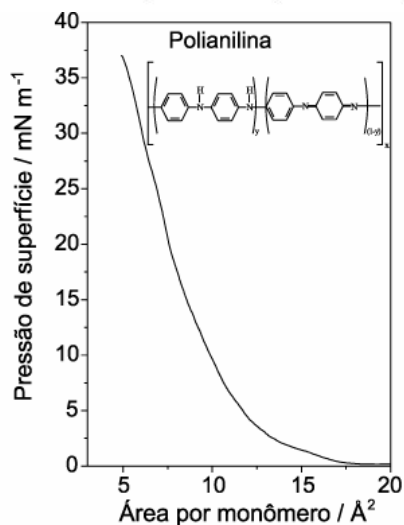
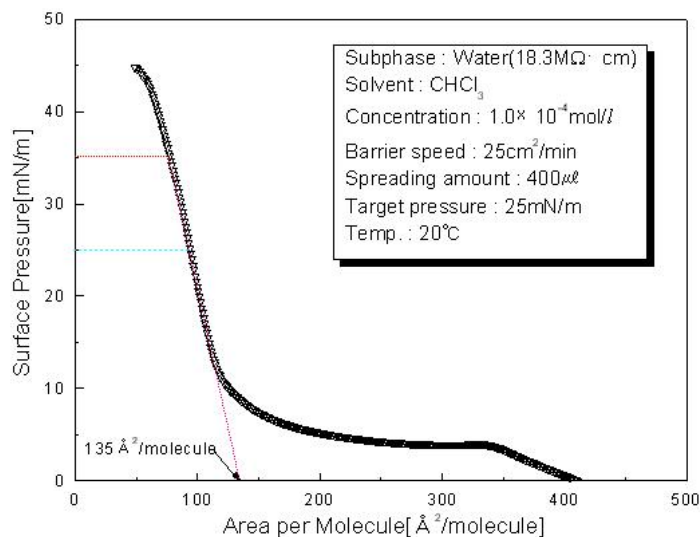


Figura 4b. Isotermas pressão-área para a polianilina. A estrutura da polianilina está mostrada na inserção. Reproduzida da ref. 35 com permissão da ACS

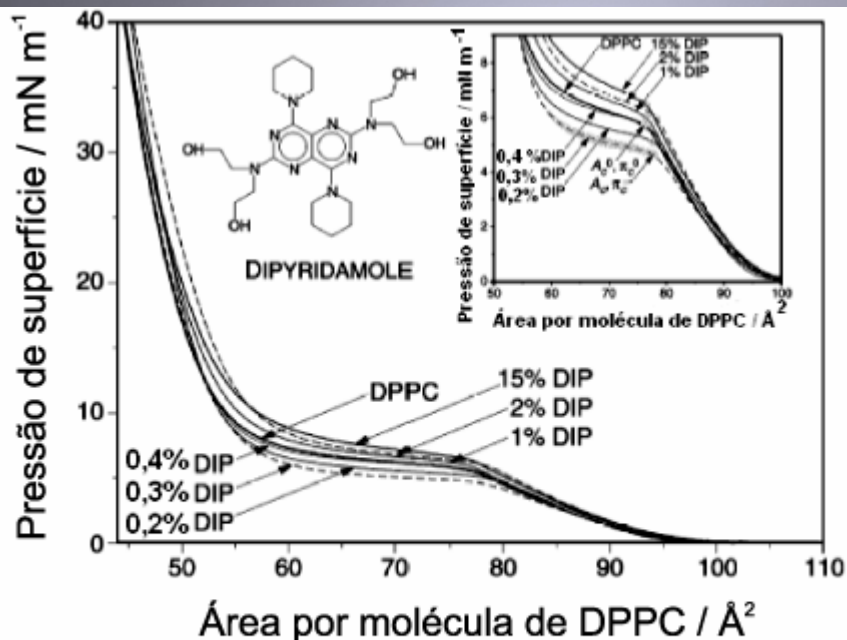
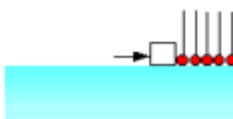
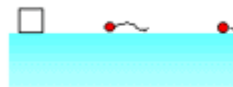
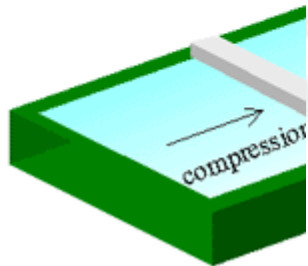


Figura 4a. Isotermas pressão-área para monocamadas ($T=21^{\circ}\text{C}$) de DPPC puro sobre subfase aquosa e na presença de dipiridamol (1 a 15 mol%). Reproduzida da ref. 18 com permissão da Elsevier

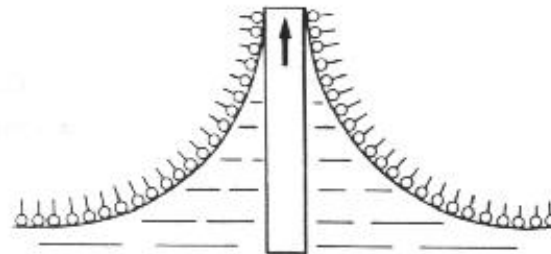
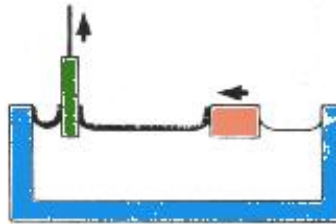
Sposoby nakładania warstw LB

◆ Langmuir Trough

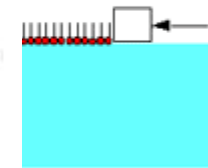
Teflon Barrier



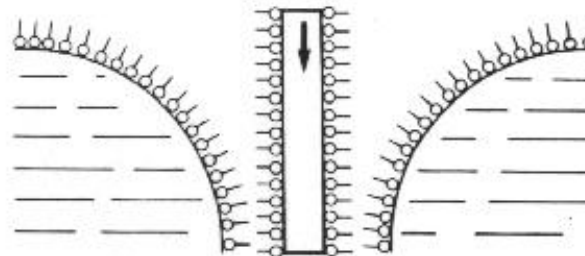
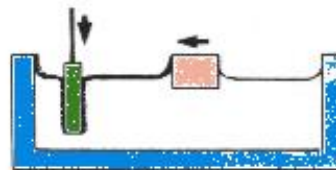
obtention de la première couche



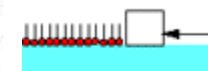
Solid Supports
down



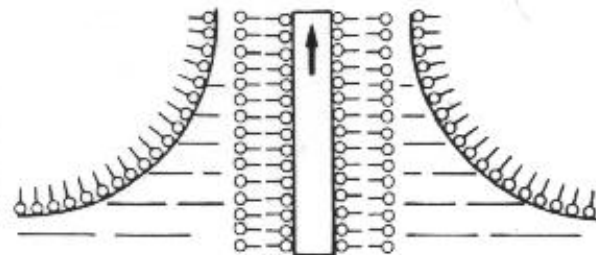
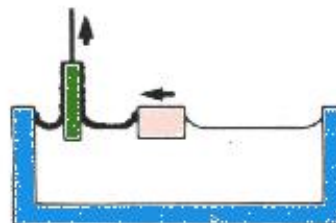
obtention de la deuxième couche



up



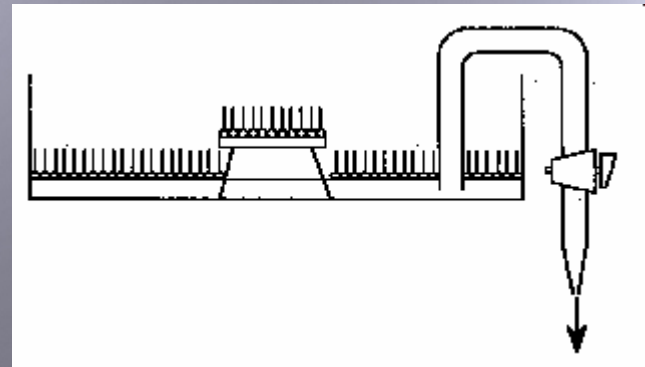
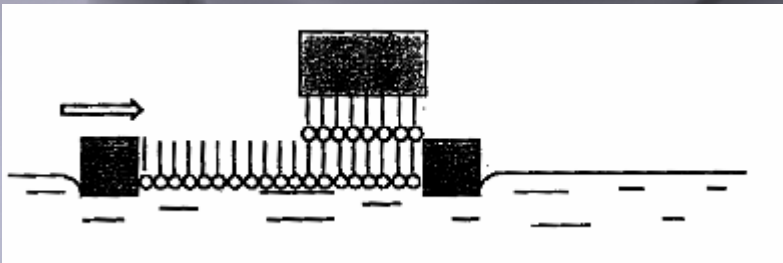
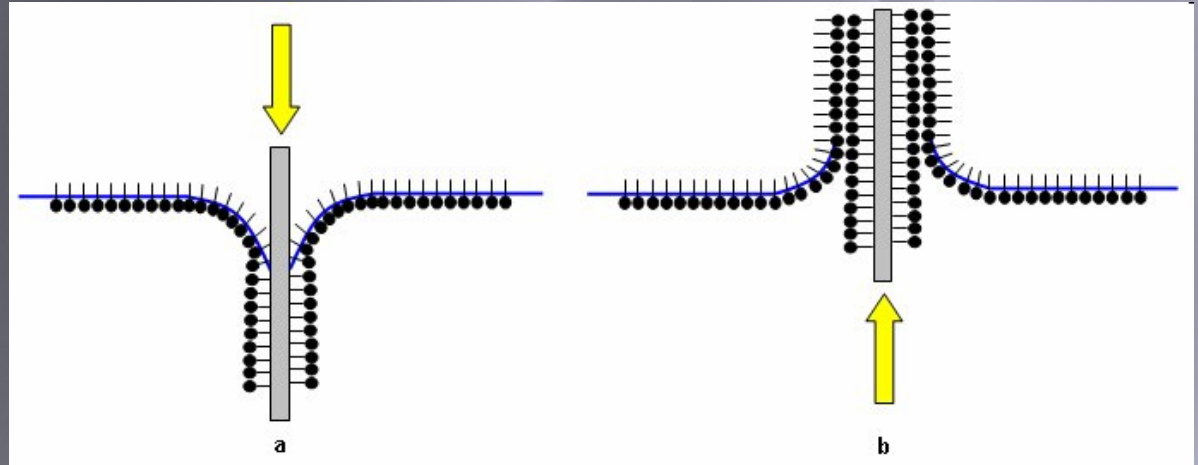
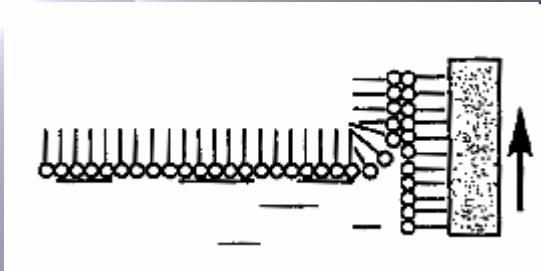
obtention de la troisième couche



Cracks on Surface
seen Observed in

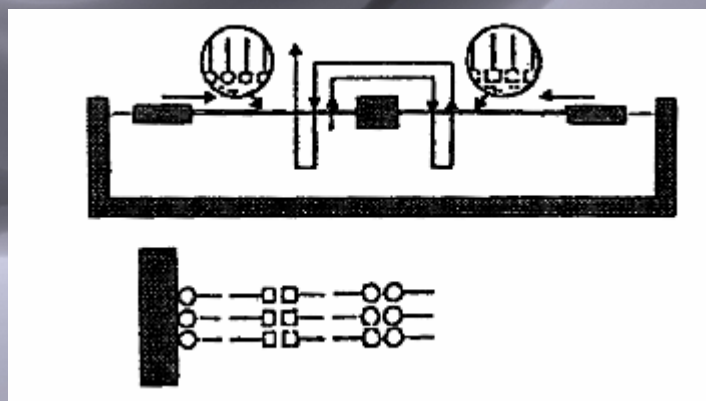
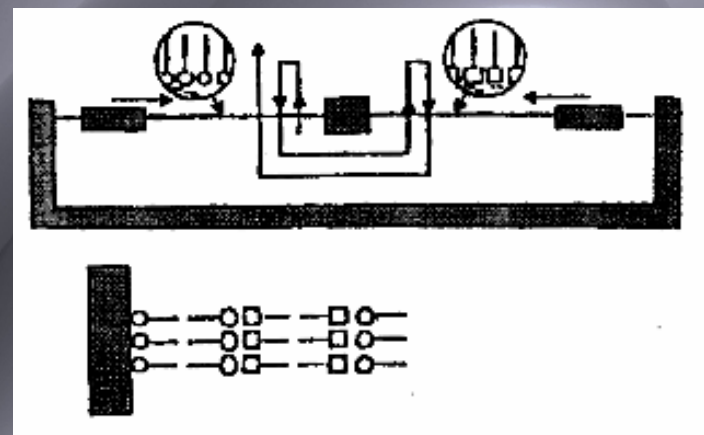
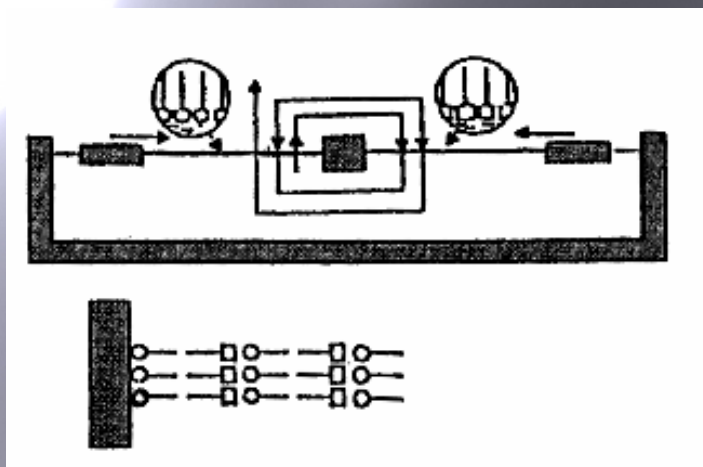
MOSAIC Project

Sposoby nakładania warstw LB

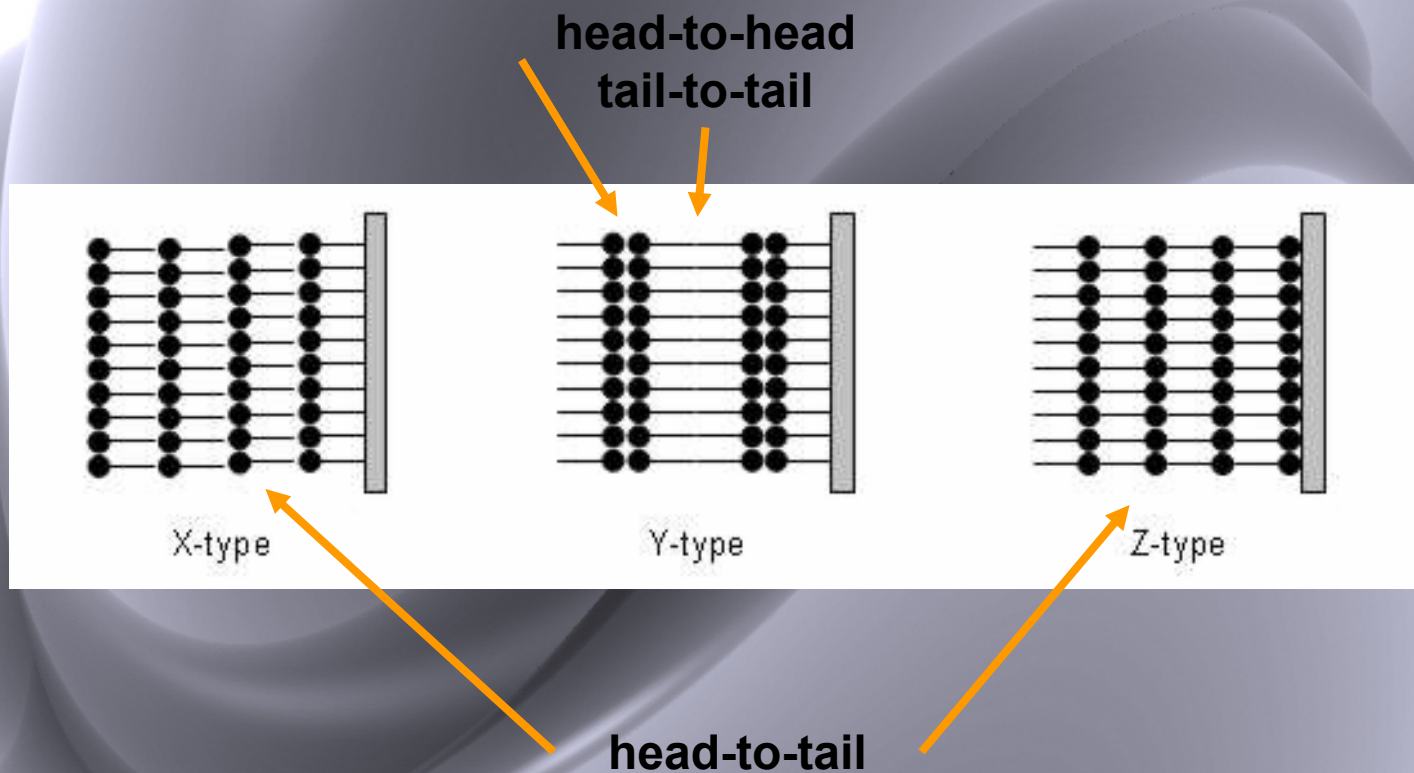


Langmuir-Schaeffes

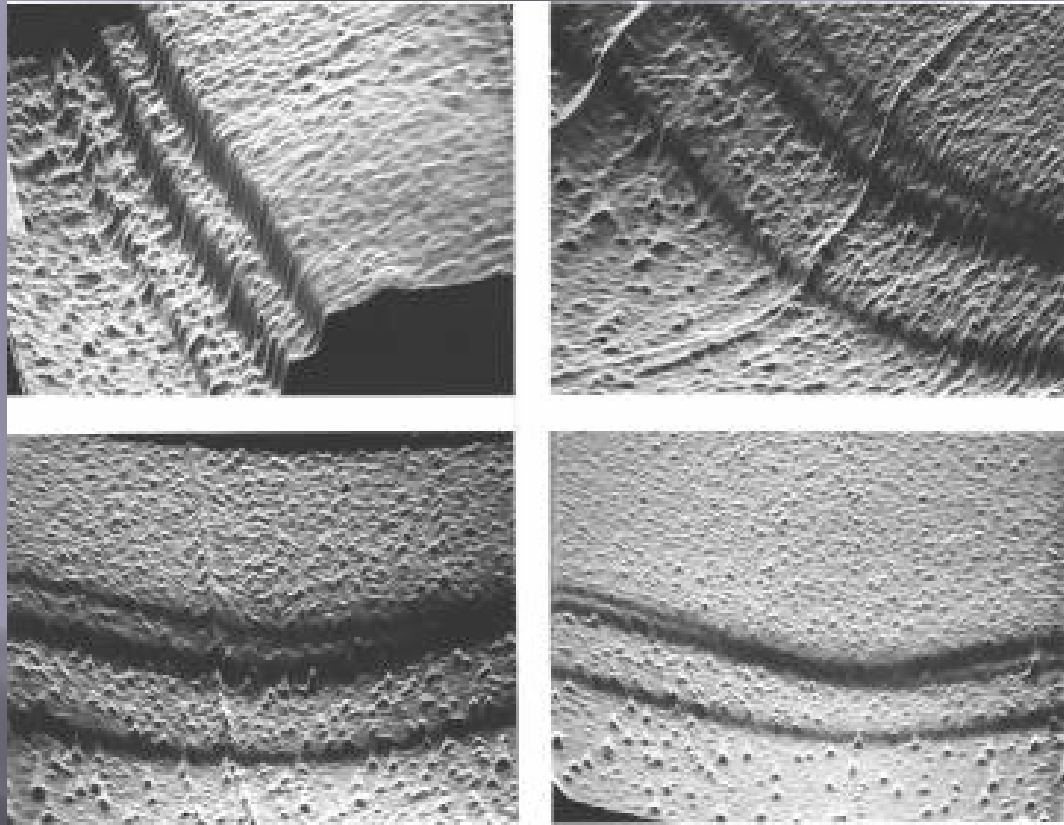
Sposoby nakładania warstw LB



Sposoby ułożenia warstw LB

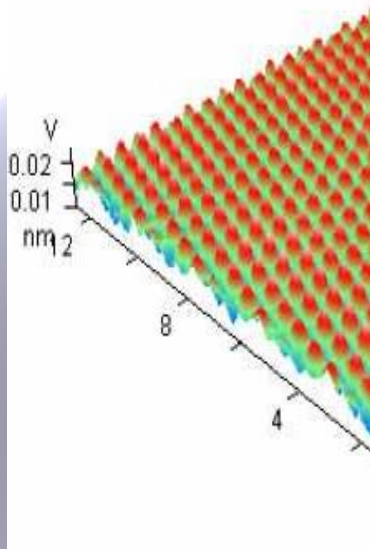


Warstwy LB pod mikroskopem

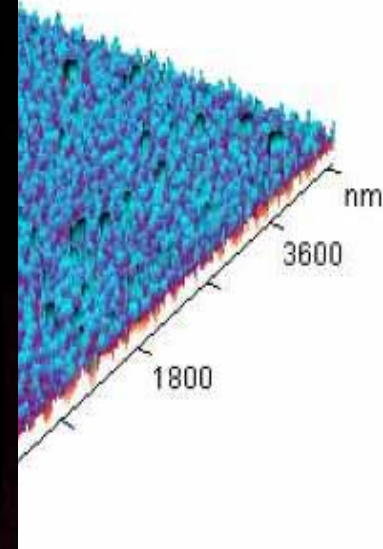
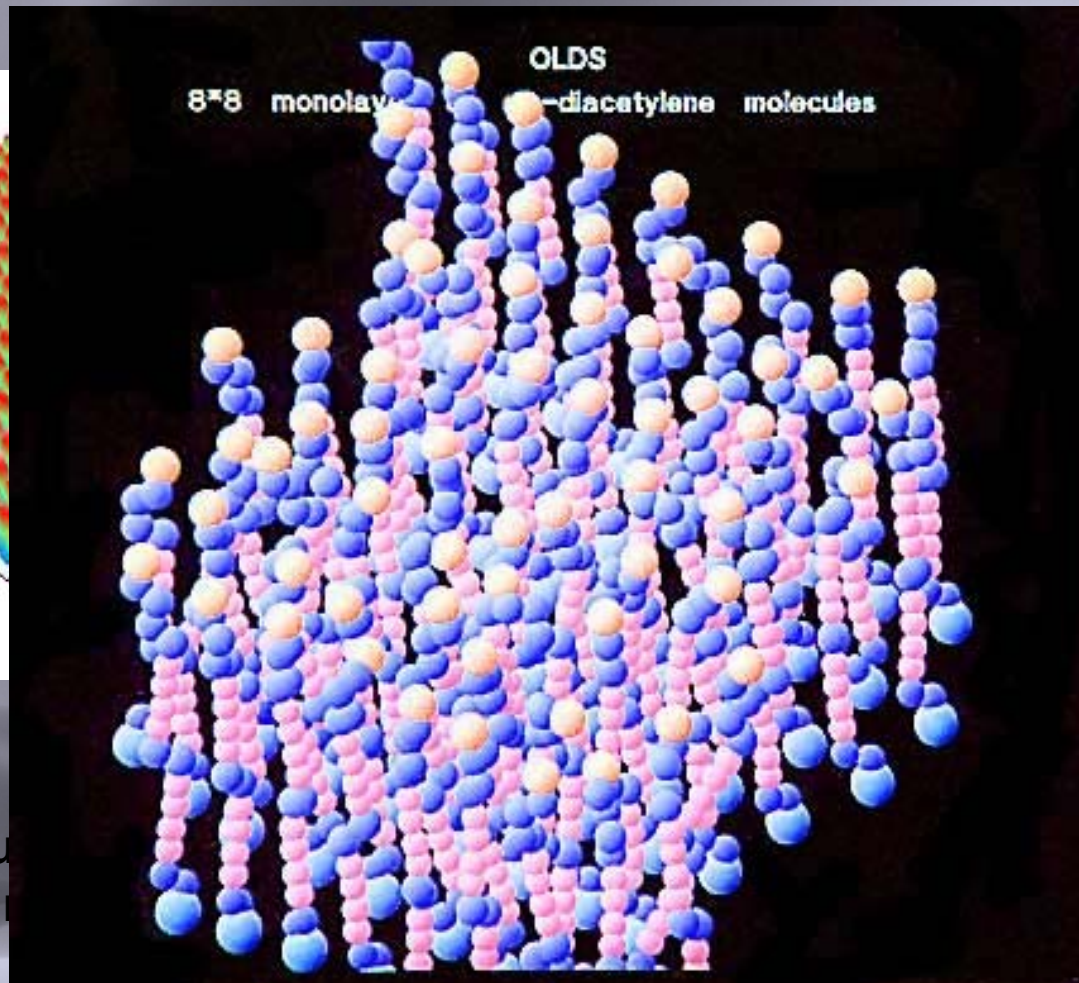


Langmuir-Blodgett film
1.5 nm step resolution with
roughness of base slide a fraction of that

Warstwy LB pod mikroskopem

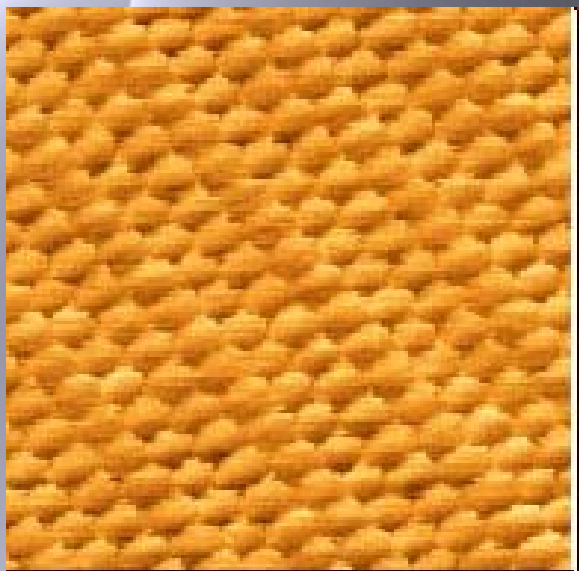


Molecular structure
Langmuir-Blodgett

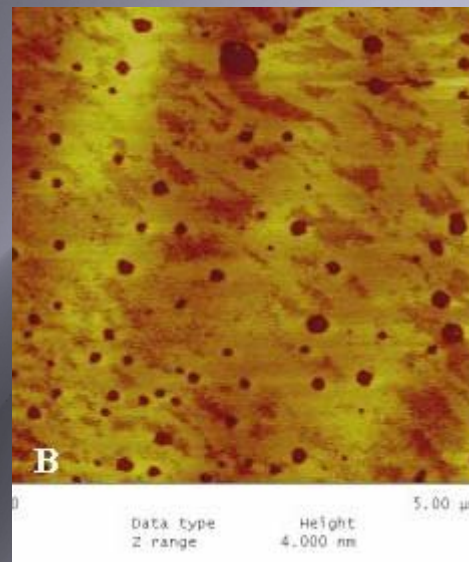


ed in LB film
obe.

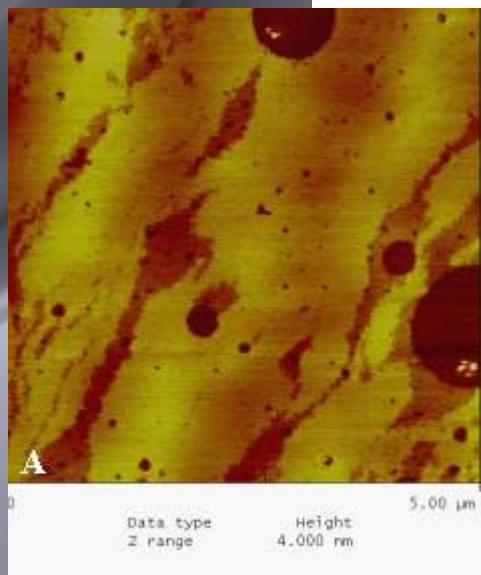
Wzrost naprężeń powierzchniowych



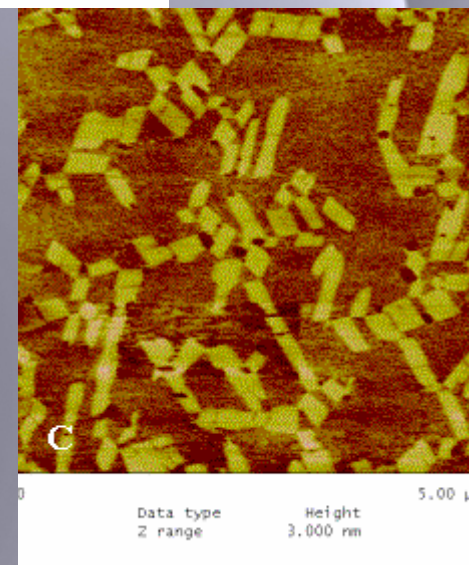
Widok na próbkę o rozmiarach 10 x 10 nm²



$\pi = 20 \text{ mN/m}$

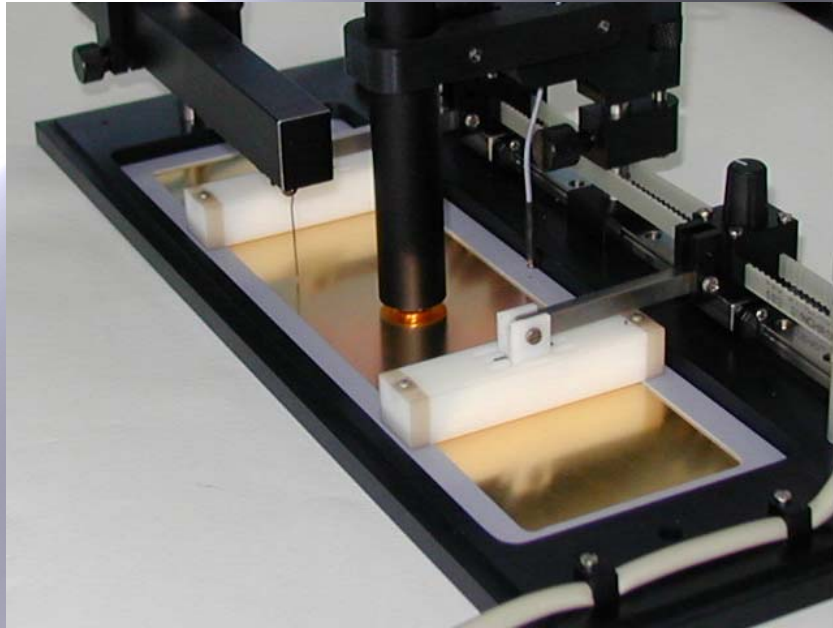


$\pi = 15 \text{ mN/m}$

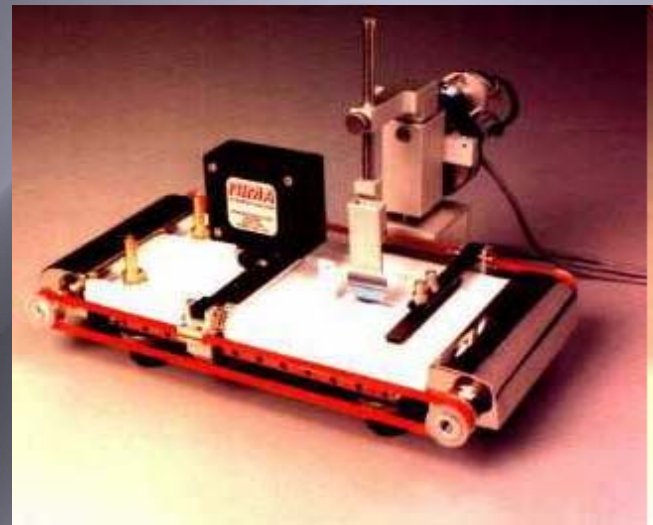


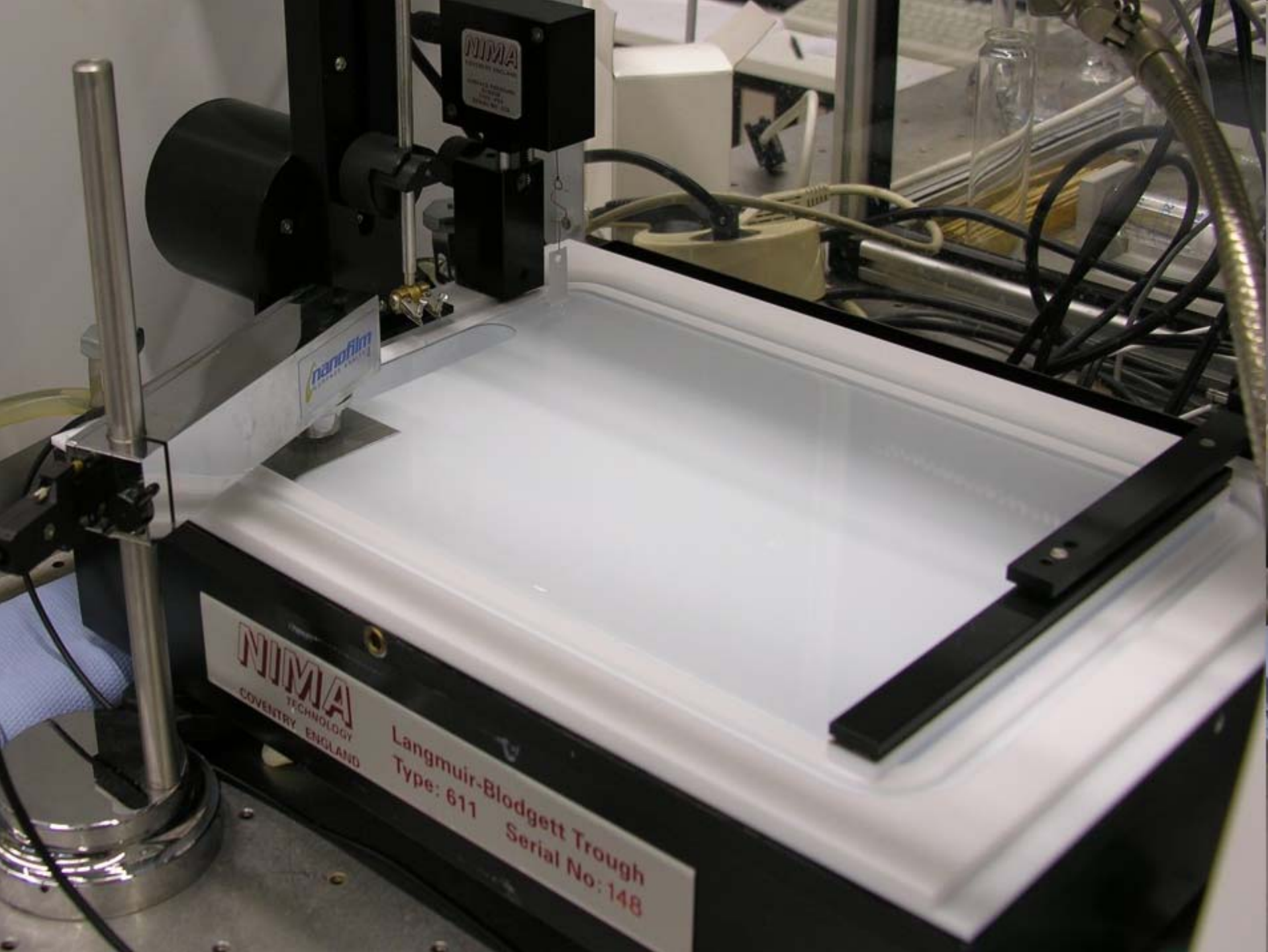
$\pi = 35 \text{ mN/m}$

Sprzęt



Sprzęt



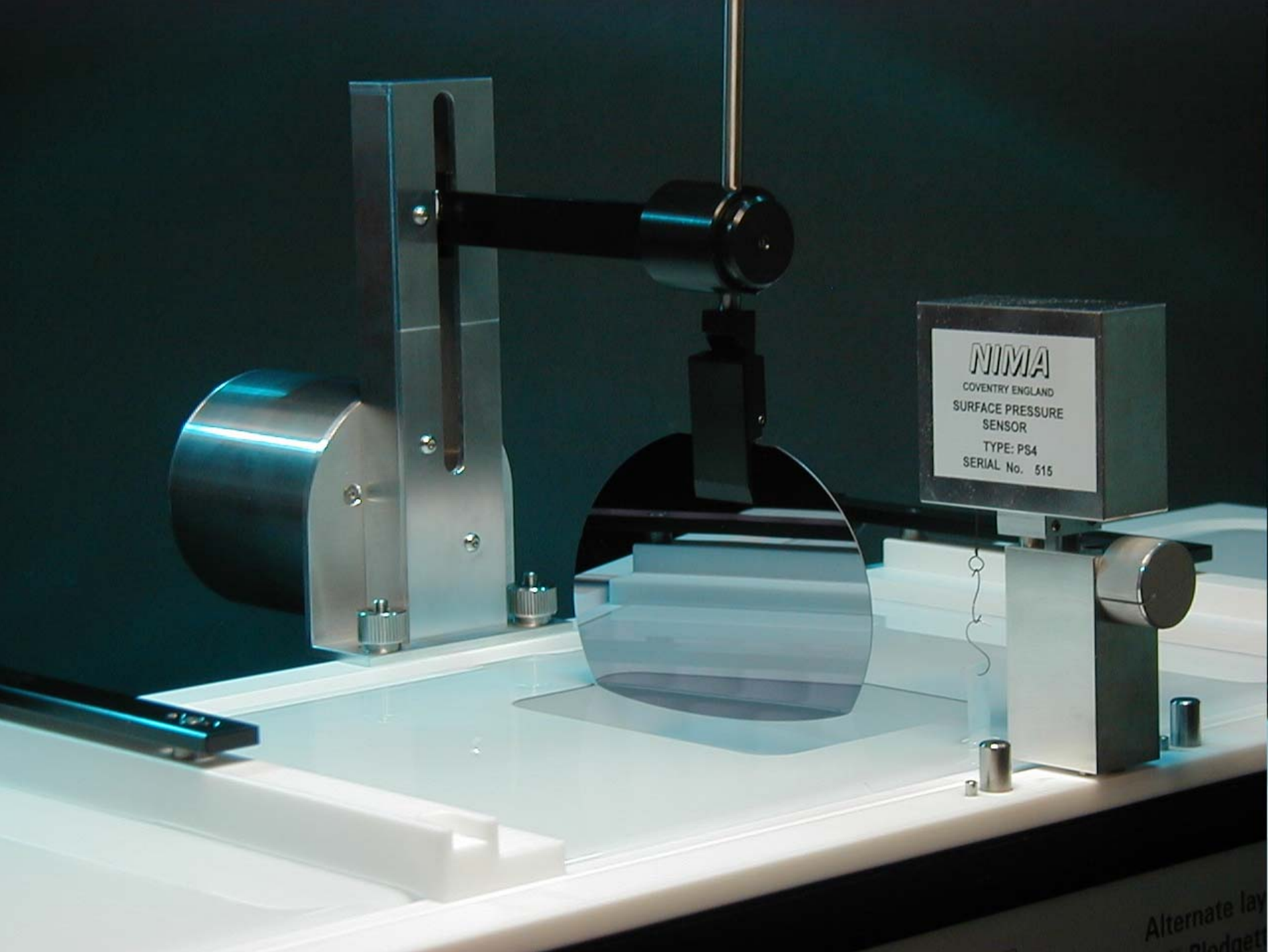


NIMA
COVENTRY ENGLAND

nanofilm
THIN FILM TECHNOLOGY

NIMA
TECHNOLOGY
COVENTRY ENGLAND

Langmuir-Blodgett Trough
Type: 611
Serial No: 148



NIMA

COVENTRY ENGLAND

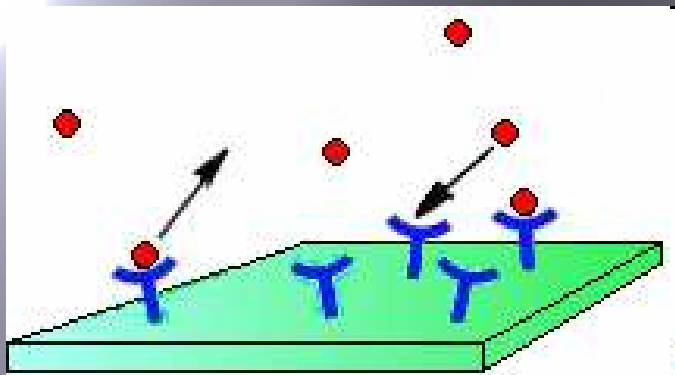
SURFACE PRESSURE
SENSOR

TYPE: PS4

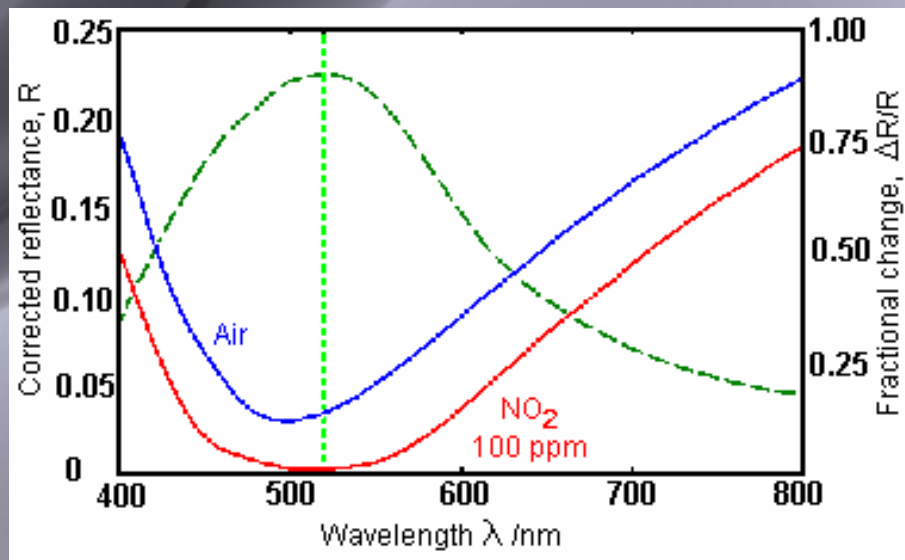
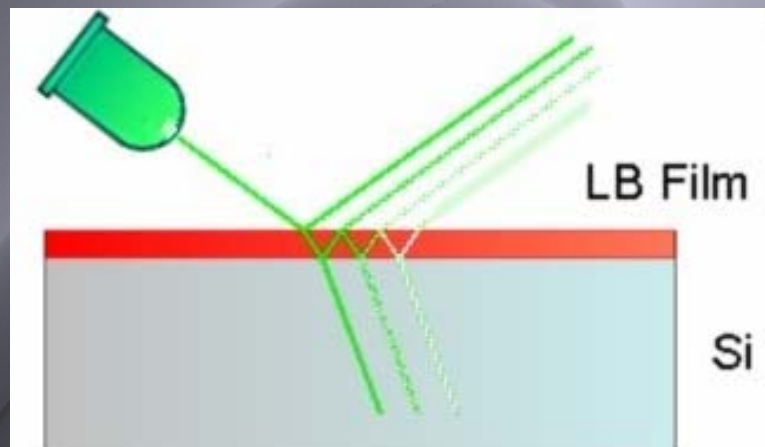
SERIAL No. 515

Alternate lay
pallet

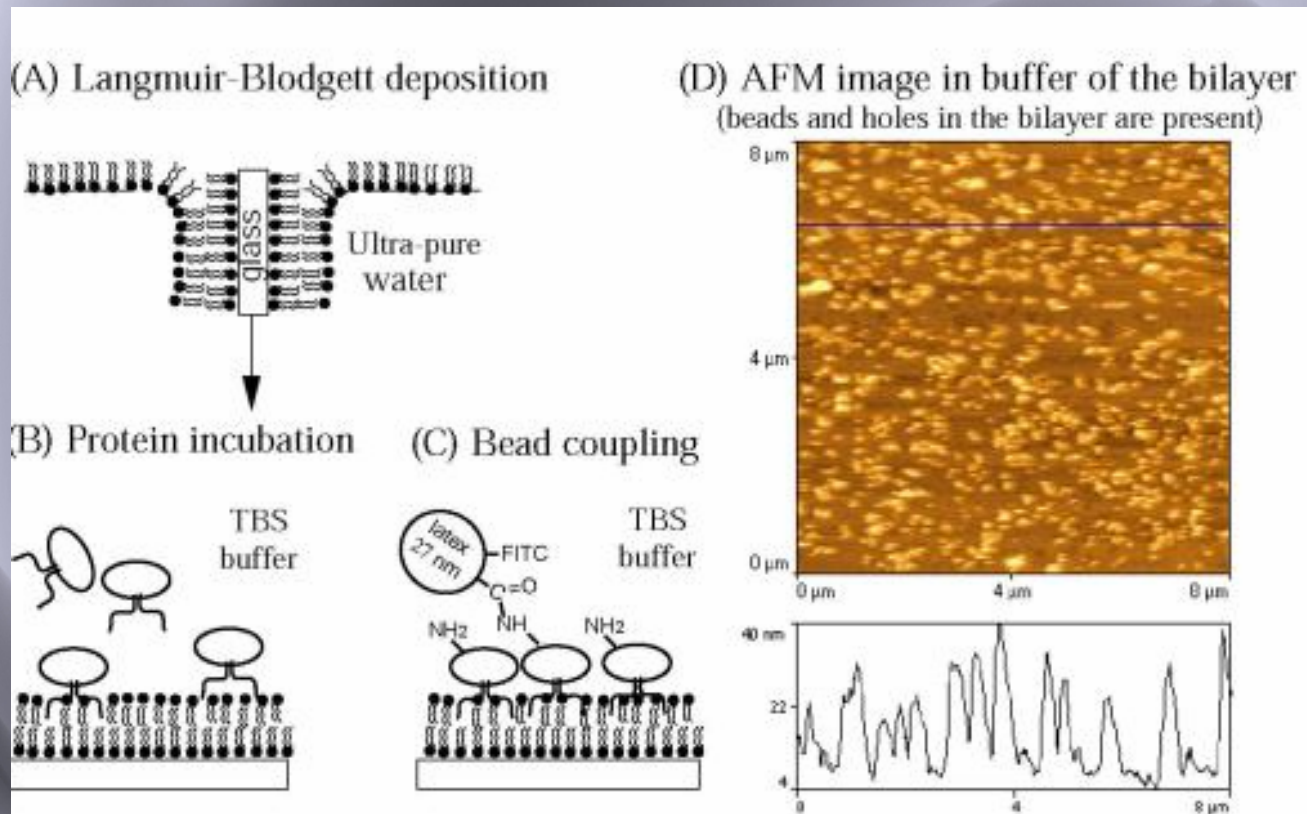
Analizatory stężenia gazu NO_2



PS1 - polysiloxane with azo dye
sidechains

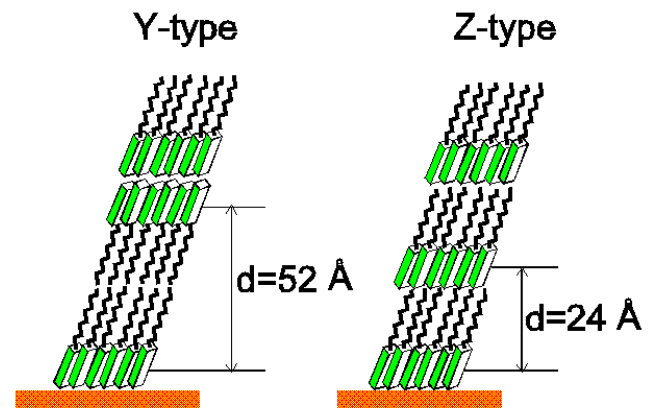
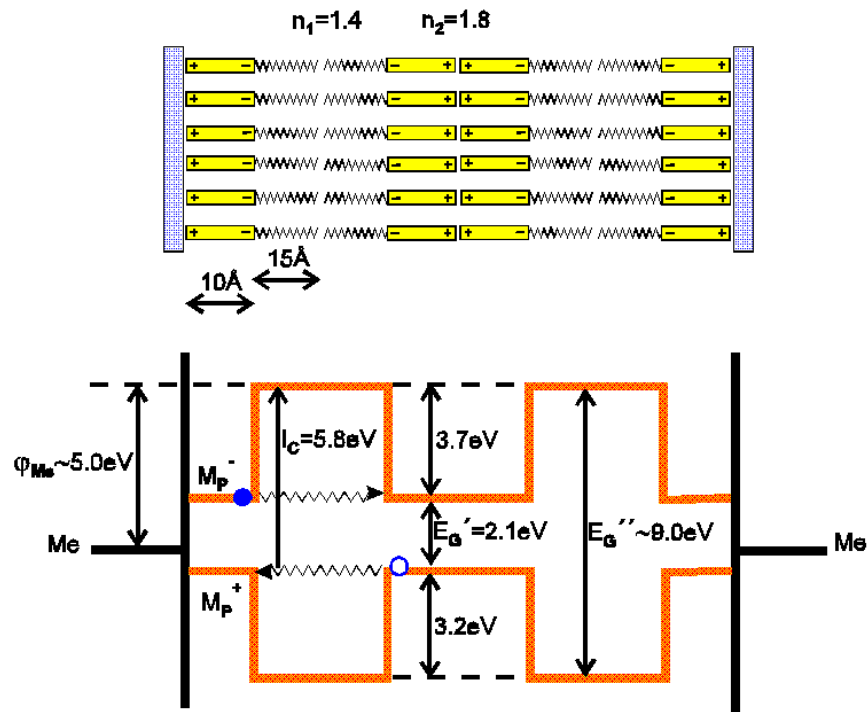


Wykorzystanie warstw LB w biologii

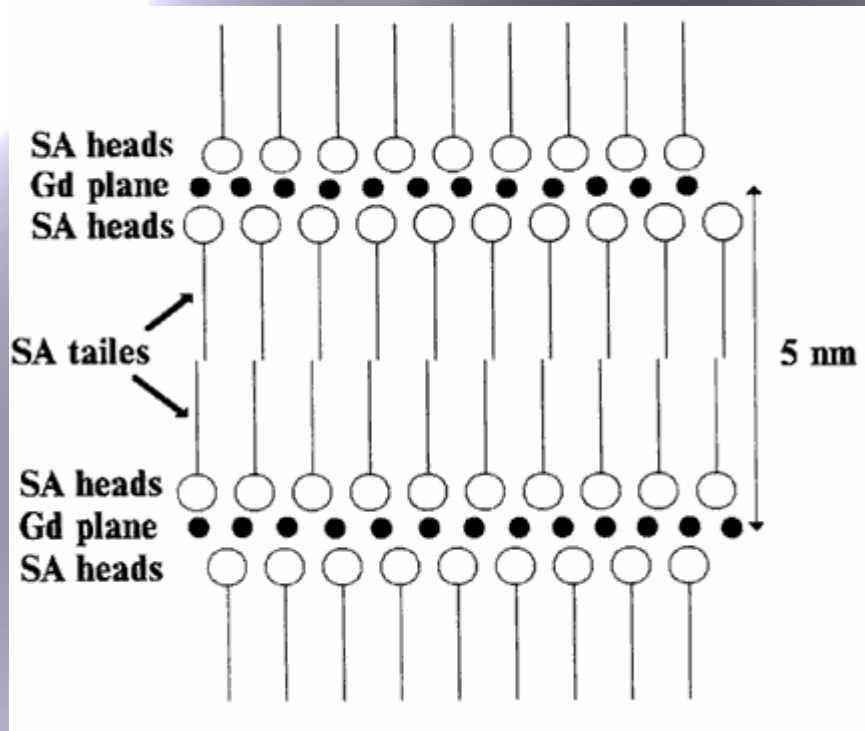


Badanie wpływu związków organicznych na błony komórkowe, symulowane w tym przypadku przez warstwy Langmuira-Blodgetta

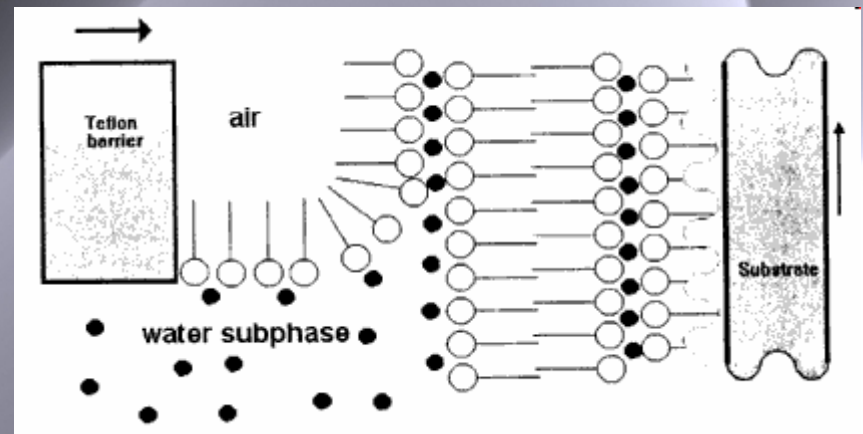
Przełączniki optyczne



Ultra cienkie media magnetyczne

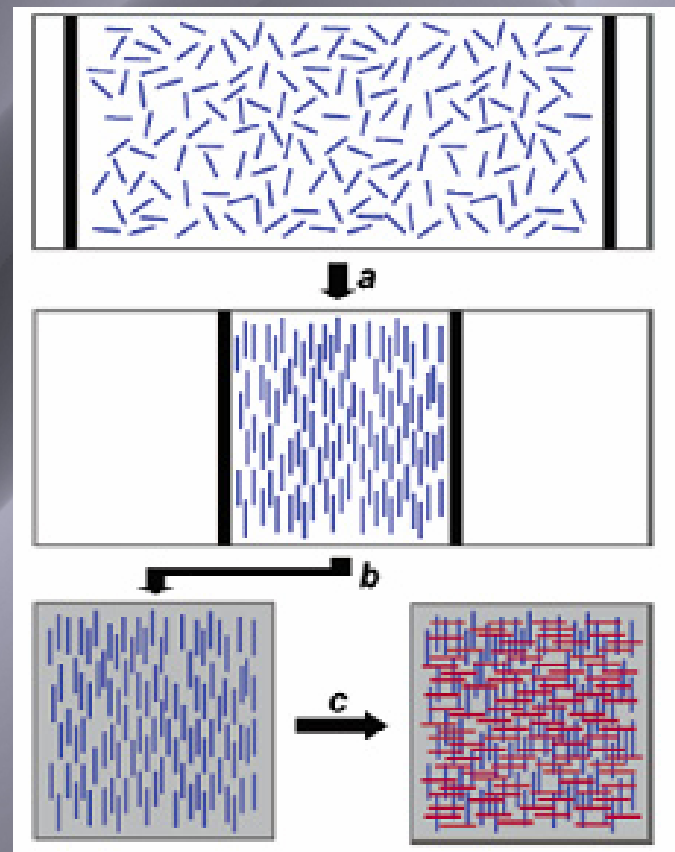
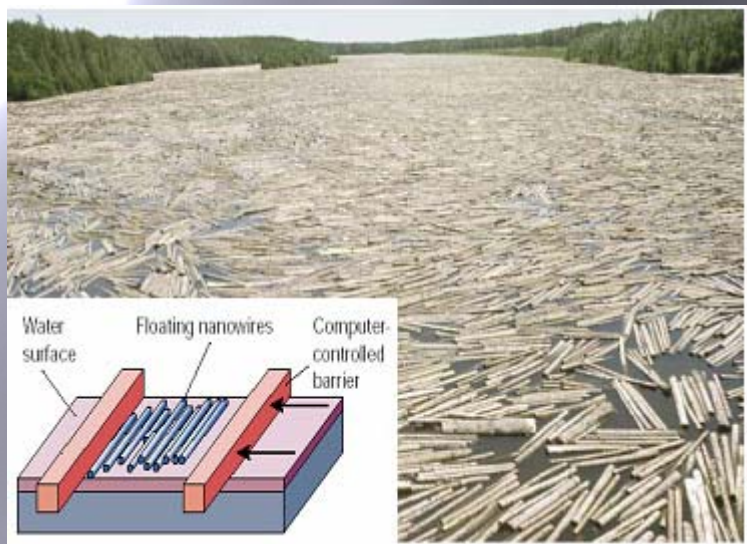


**Cienka warstwa Gadolinu,
utworzona przez nakładanie
łańcuchów kwasu stearynowego**



- Ultra cienkie napędy magnetyczne
- Narzędzia do nanoelektroniki
- Ultra-cienkie stałe magnesy
- Warstwy pochłaniające promieniowanie elektromagnetyczne

Technika Langmuira – Blodgetta wykorzystywana przy układaniu nanorurek



Dziękuję

