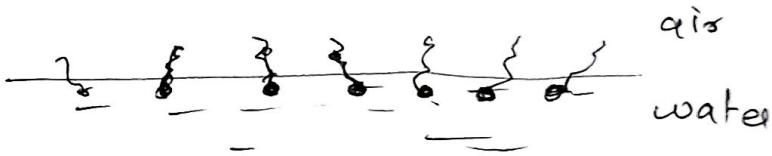
Langmuir Blodgett films :-

The preparation of ordered thin films is of interest in the construction of electronic devices. Ultrathin films of conducting polymers have been projected to have applications in molecular electronics. One method that has gained popularity for preparing ordered thin films is the Langmuir - Blodgett technique.

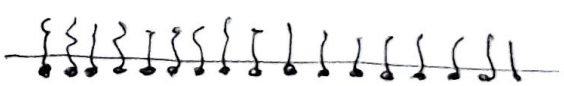
Principle :-

This technique makes use of molecules with a hydrophillic head and a hydrophobic tail which can form a monolayer at an air-water interface and then can subsequently transferred on to a substrate.

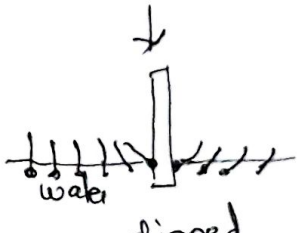
→ A small amount of the ampillic compound is added to water wherein the molecules arrange along the air-water interface with the hydrophillic end pointed into water and the hydrophobic tail ~~outward~~ pointed outwards towards air.



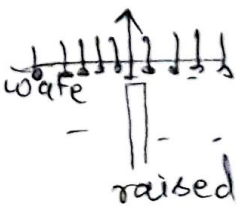
→ The layer is then compressed mechanically. The compression causes the molecules to be aligned in the same way on the surface of water

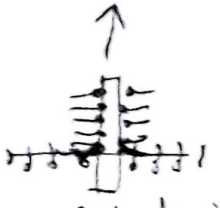


→ After the molecules are close packed, the layer is transferred to a substrate by dipping or raising a substrate through air/water interface.



or





If substrate is hydrophillic, the hydrophillic end is attracted to substrate

Eg. conducting polypyrrole films have been prepared.

3-octadecylpyrrole (ampiphillic molecule)
(3ODP)

→ hydrophobic tail (3ODP)

↙ hydrophillic

Small quantity of the above molecule and large excess of pyrrole monomer is taken. The 3ODP attaches to the substrate, then the pyrrole molecules get attracted to the 3-ODP monolayer forming ordered layers. They are subsequently polymerized to get highly ordered thin films.

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