

04-02-2021

DSSC

Dye molecule acts as electron donor
→ is reversible one



TiO₂ - Nano particles → acts electron acceptor

Electrodes

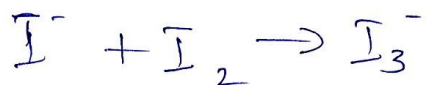
Anode: ITO - Coated with TiO₂ particles
dia-30 nm

over TiO₂ - Dye sensitizer-molecule
coating

Dye molecules - should have cooh groups
so that interaction between TiO₂
and Dye would be effective

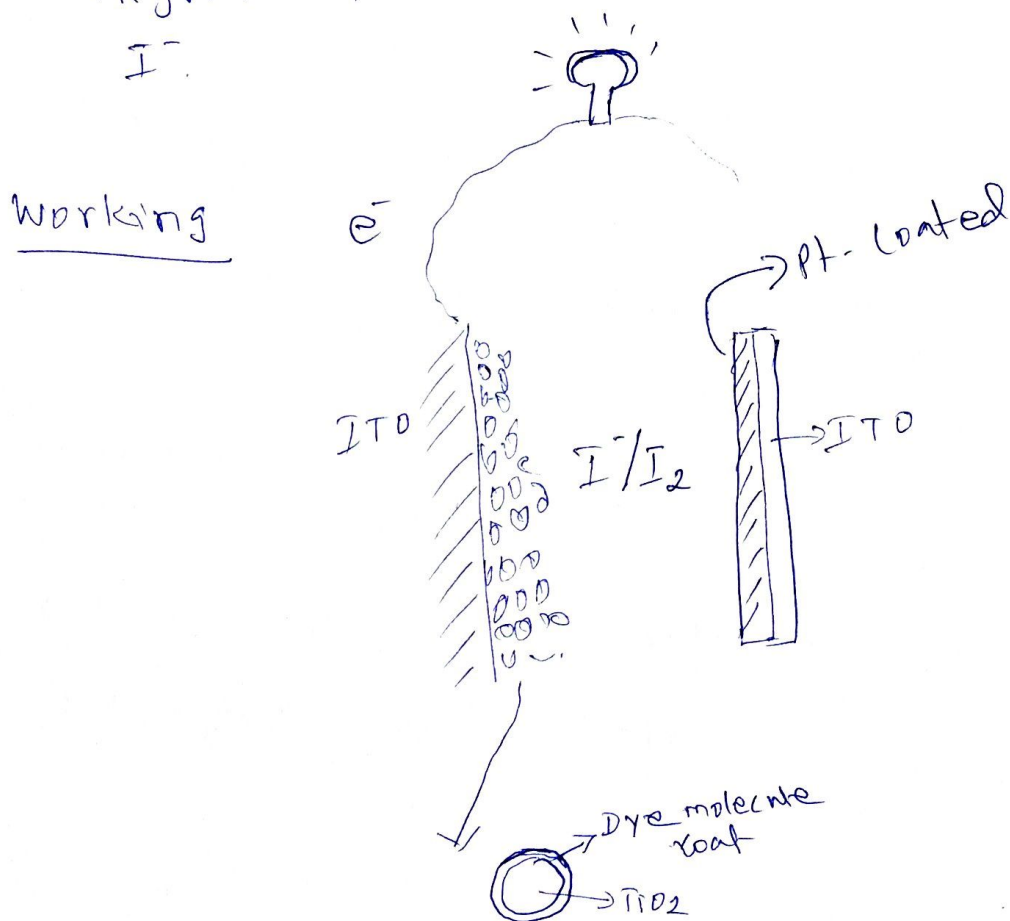
Cathode: ITO - Coated with Pt metal particles
for an effective utilization
of e⁻, without dissipation

Electrolyte: Redox system of (I^-/I_2)



I_2 is dissolved in I^-
Iodide Iodine
milli molar
Concentration
 I_2 - 10 times
higher than
 I^-

presented in Acetonitrile - Org. solvent

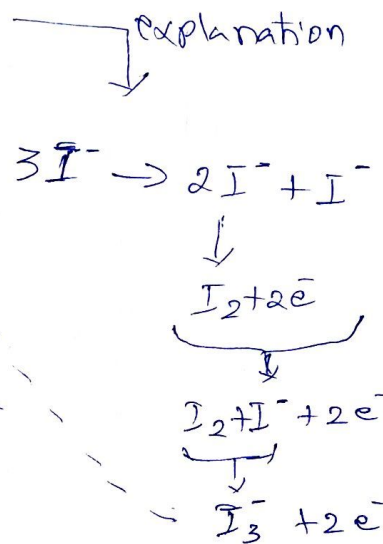
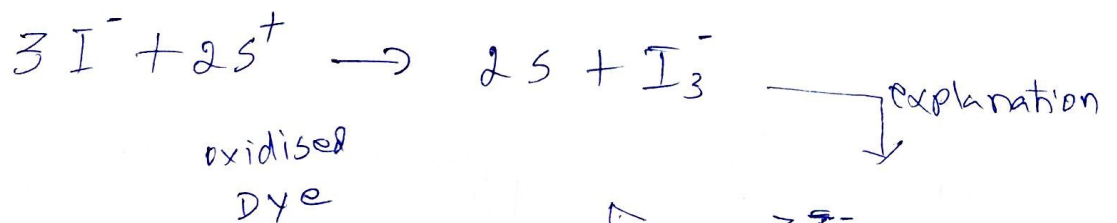
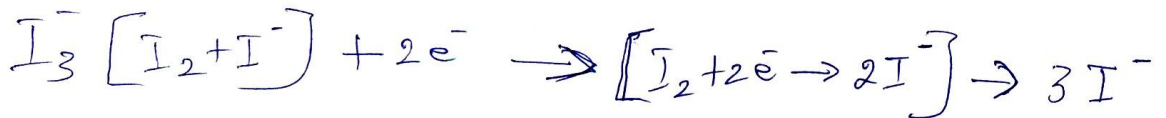
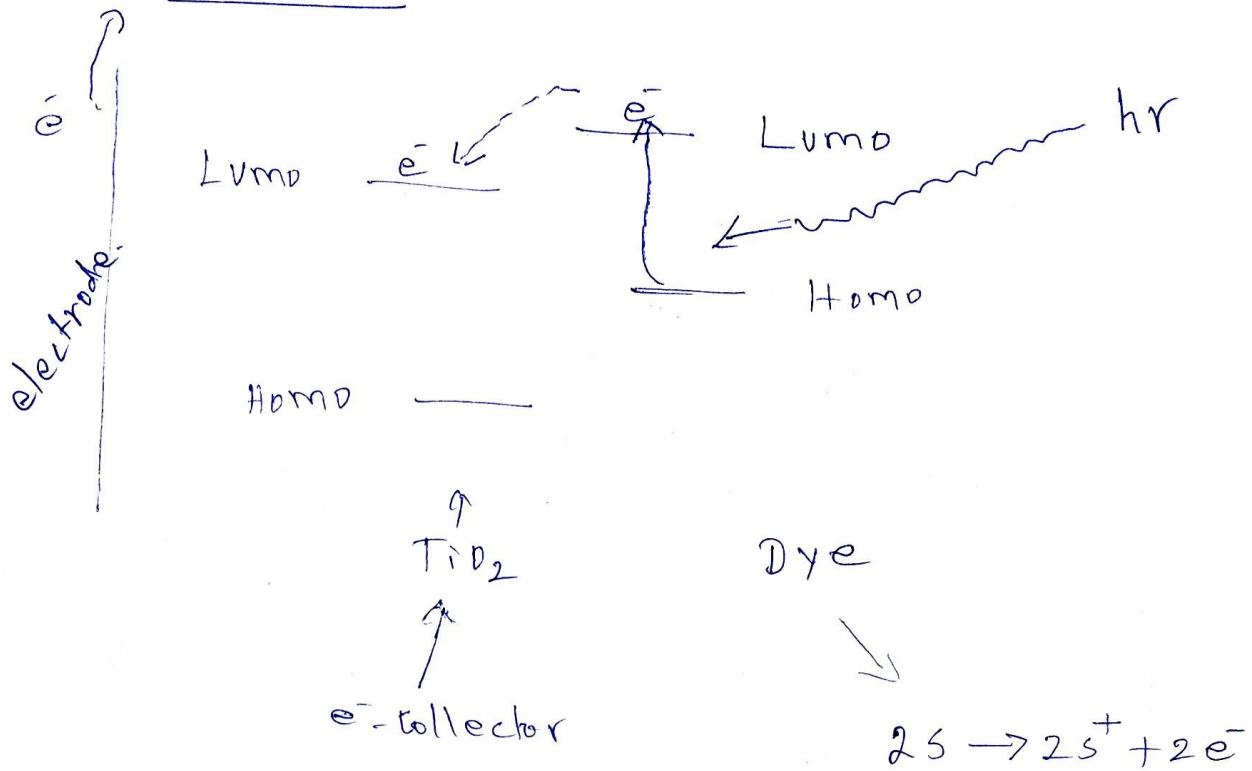


TiO_2 - immersed in Dye soln

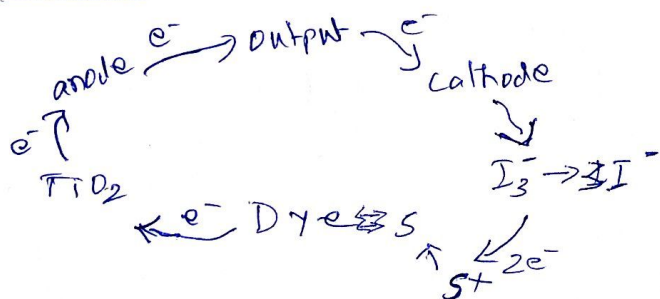
TiO_2 - wider band gap.

Dye - LUMO and HOMO level should be in a position
of donating e^- to LUMO of TiO_2 as
shown below

Principle

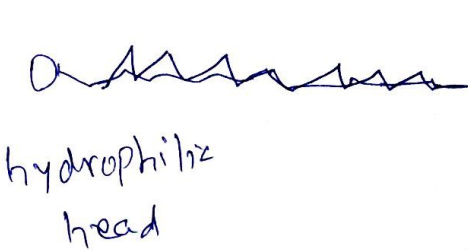


Cyclic - Process




LANGMUIR - BLODGETT FILMS

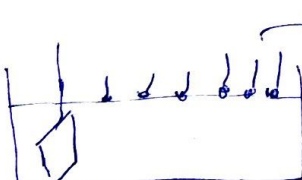
Ordered thin film \rightarrow for construction of electronic devices


molecules -  hydrophilic head hydrophobic tail

Monolayer

 \rightarrow air/water interface

 \rightarrow Film substrate \rightarrow dipped \rightarrow get coated.

 \rightarrow soln

 \rightarrow compression

multilayers - coated by multiple dipping
as shown in study materials

Film-types \rightarrow next to next page \otimes

Polymeric Films can also be prepared

molecules - with polymerisable unit.

↓ hr. / UV / Δ

Ex:

Polydiacetylene [amphiphilic]



HeptaDeca-4,6-diyne-1-ol

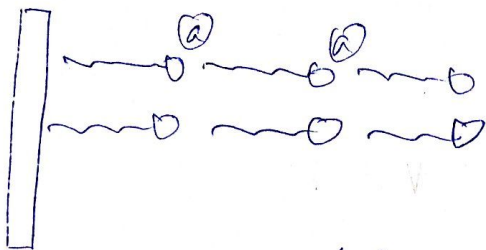
Stability → counter cation (Cd^{2+})



Advan Applications

- ① Non linear optics
- ② Nano litho gra phy
- ③ Digital (or) Alphanumeric displays - calculators, clocks
- ④ signal display -
- ⑤ Analog Display

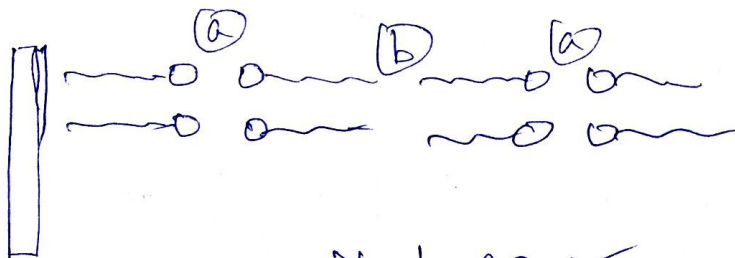
LB-type Film (*)



X-type ✓

Hydro
phobic
Surface

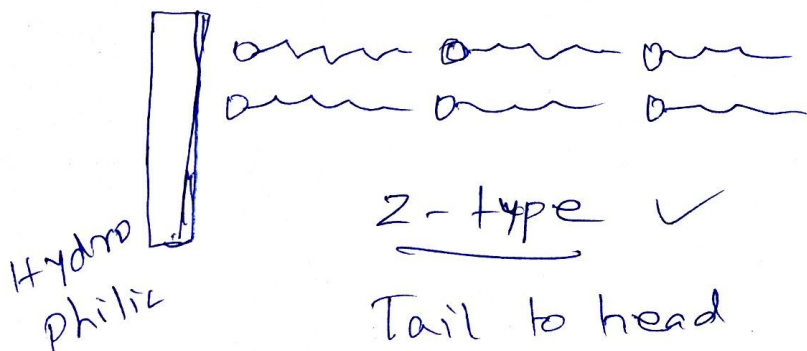
Head to tail



Hydrophobic

γ-type ✓

a Head-head b Tail to Tail



Hydro
philic

Z-type ✓

Tail to head