Application of Fullerene (C60) As interlayer in Perovskite Solar Cells

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Introduction

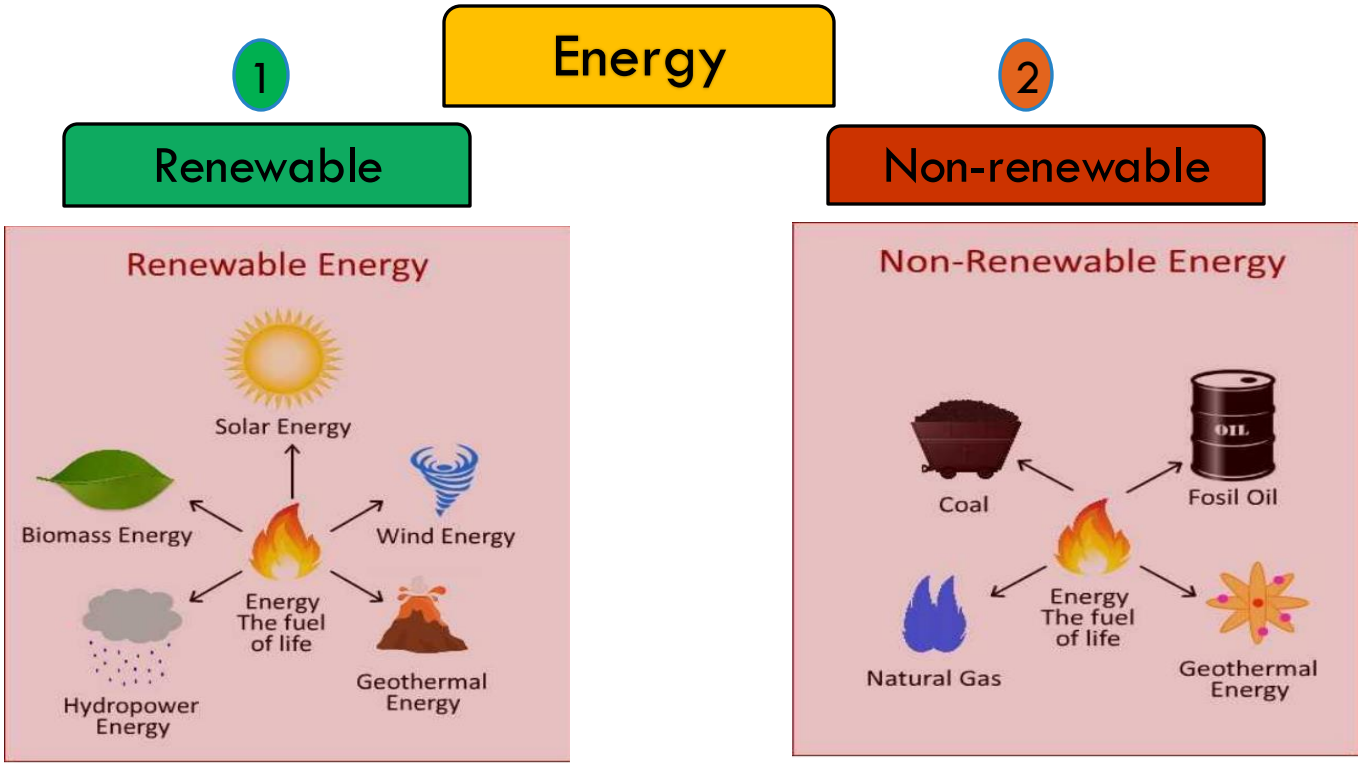
Topics that will present here are:

- **Future of energy**
- **Solar cells**
- **Perovskite solar cells (PSCs)**
- **Our results**
- **Recommended future works**

Energy

According to Feynman :

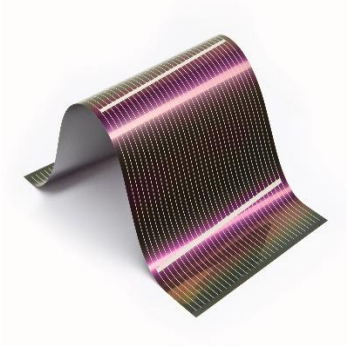
Energy is a certain quantity that does not change in the manifold changes which nature undergoes.

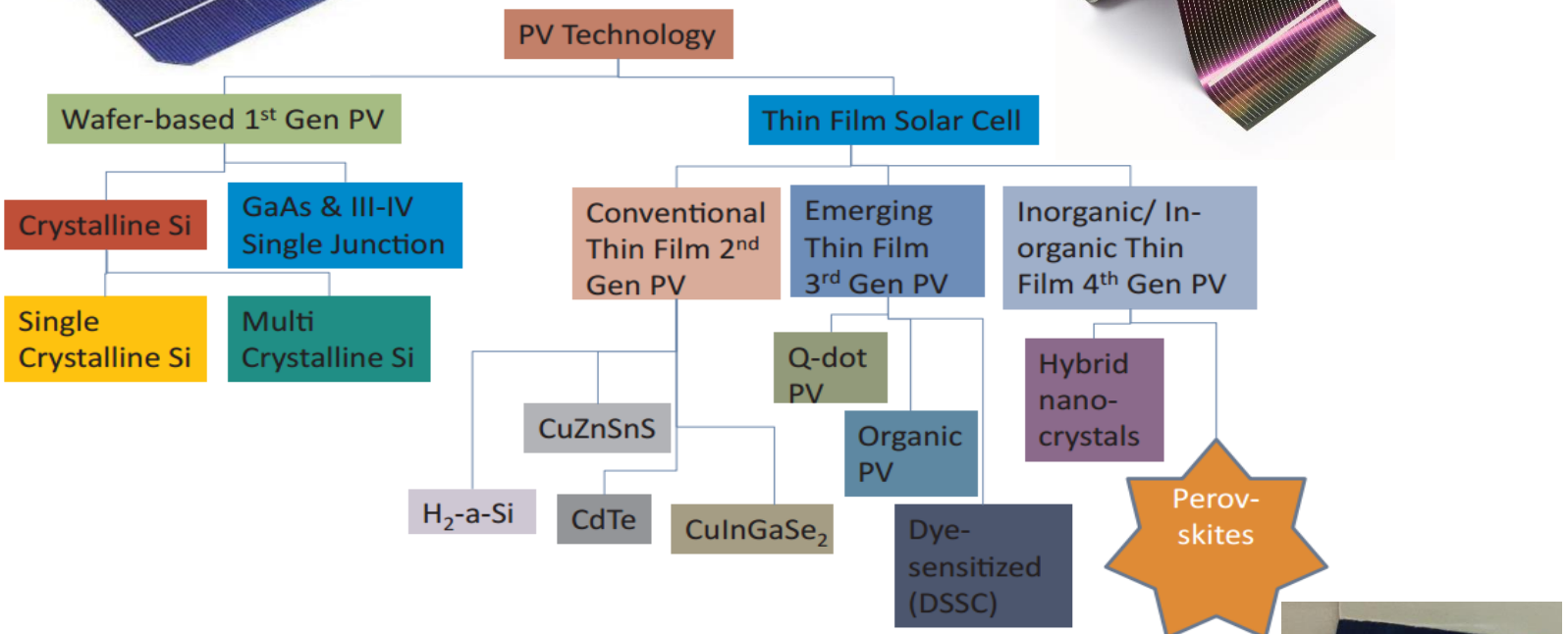


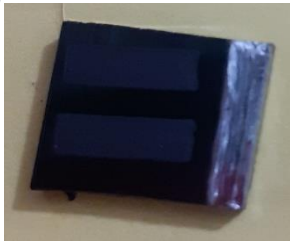
Energy Consumption worldwide

Solar cells

Devices that converts sunlight energy directly into electricity.



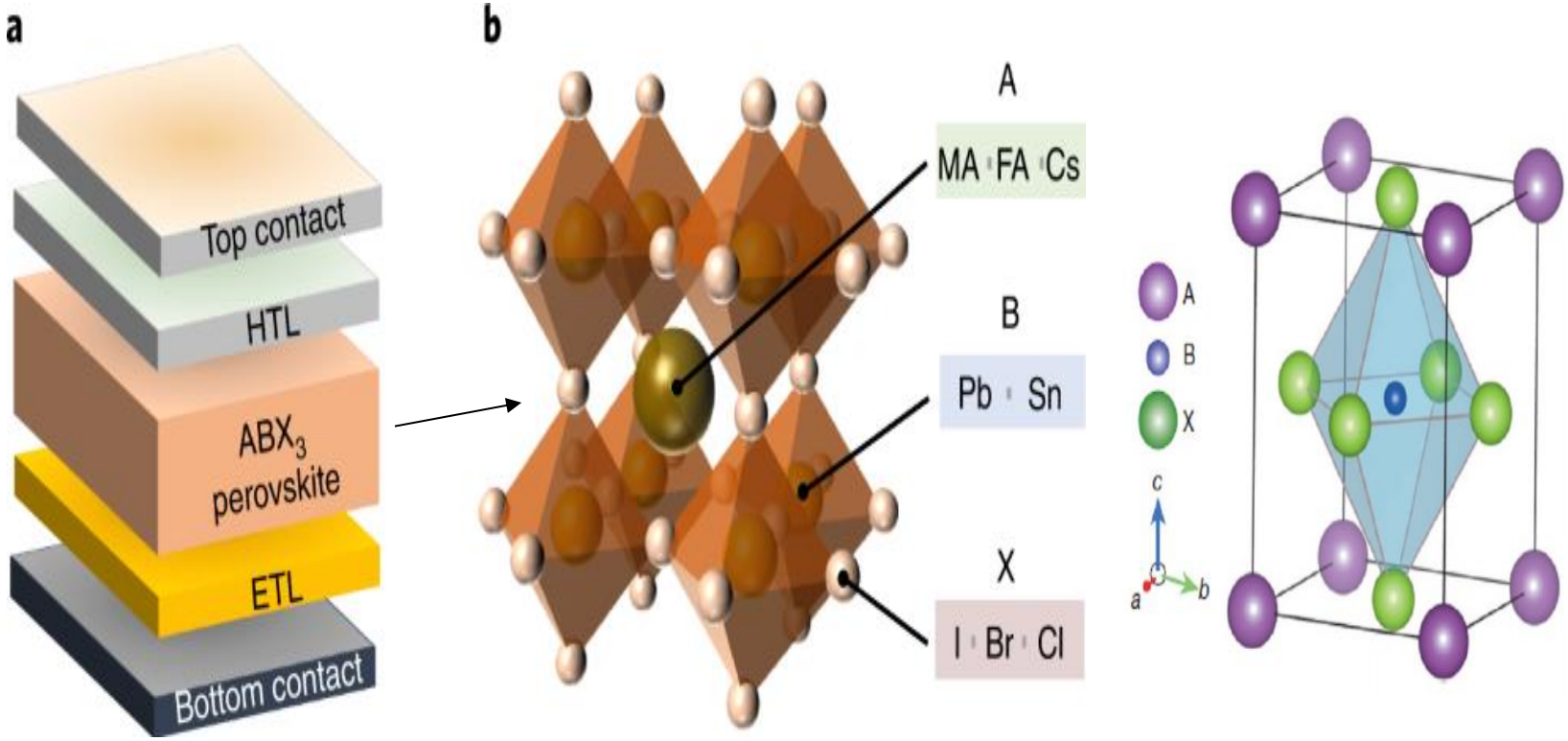




Perovskite Solar Cells

Perovskite solar cells consist of the following layers

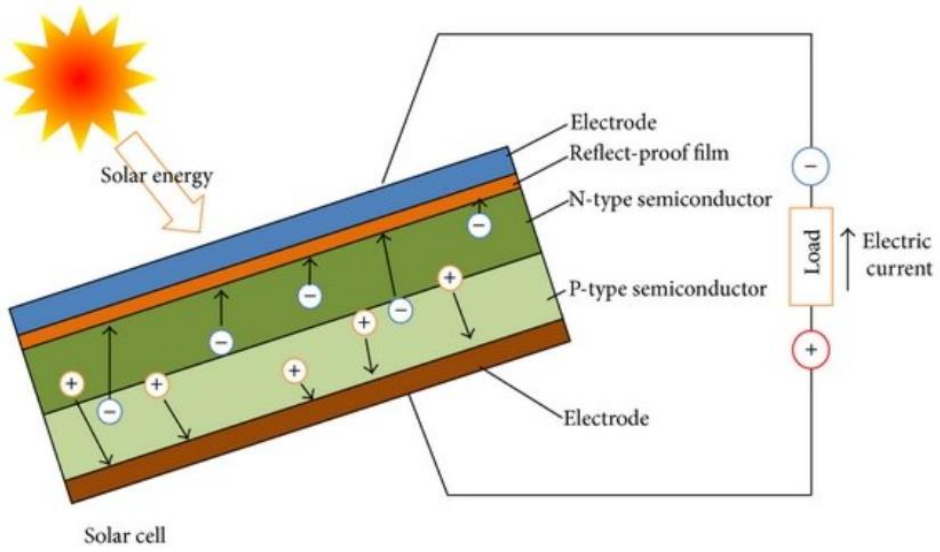
(1) Glass+FTO (2) Electron transport layer (ETL) (3) Light absorbing material (perovskite layer) (4) Hole transport layer (HTL) (5) Metal electrode (Ag, Au, Al, Cu and …).



Working principles of solar cells

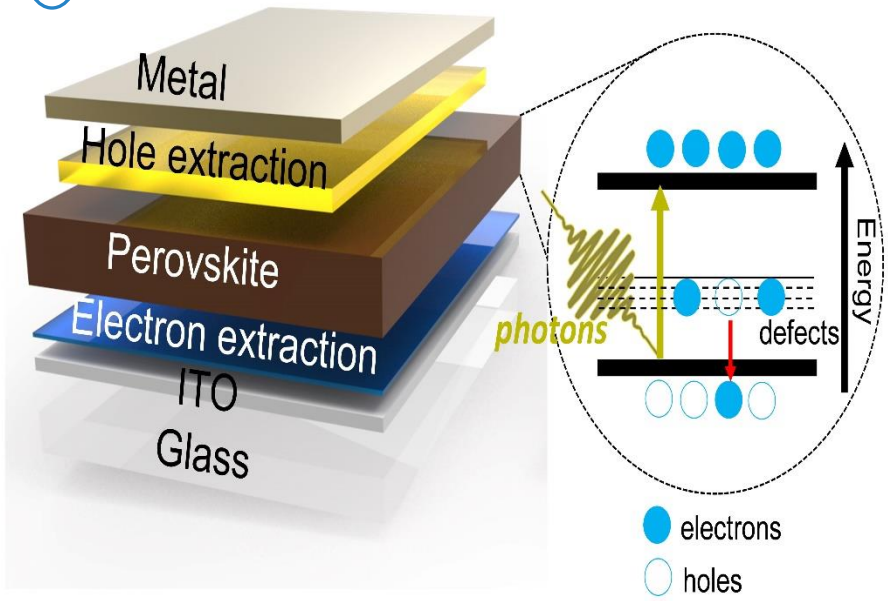
Homo-Junction

1. Shining light on the active layer
2. Generating electron-hole pair
3. Due to internal electric field electrons move to n-type material and holes move to p-type material



Hetero-Junction

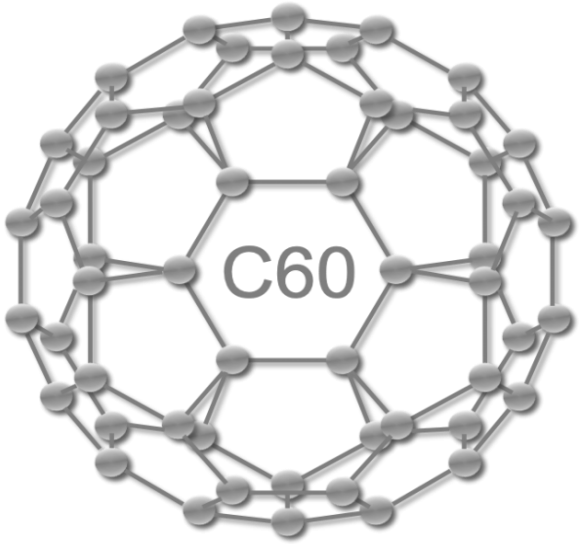
1. Shining light on the complete cell
2. Generating electron-hole pair (Perovskite layer)
3. Electrons extracted by (ETL)
4. Holes are extracted by (HTL)



Fullerene C60 Bucky balls

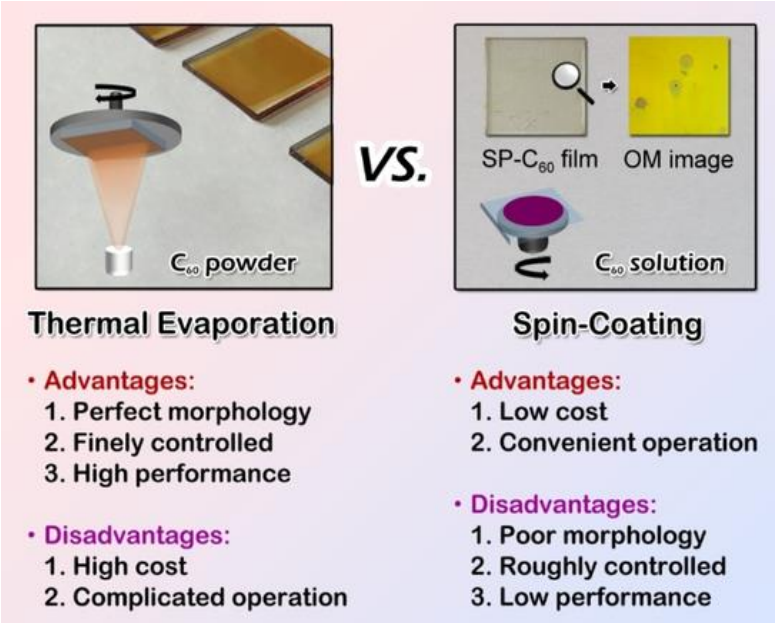
- Like diamond and graphite, fullerene is a carbon allotrope
- It was discovered in 1985 H.Kroto, R.Smalley, R.Curl by vaporizing carbon in Helium atmosphere
- It consists of 60 carbon atoms
- Here we use it as PSCs interlayer because we are able to modify it so tiny around 20nm

Molecular structure



Solution (C60 powder in Chlorobenzene)

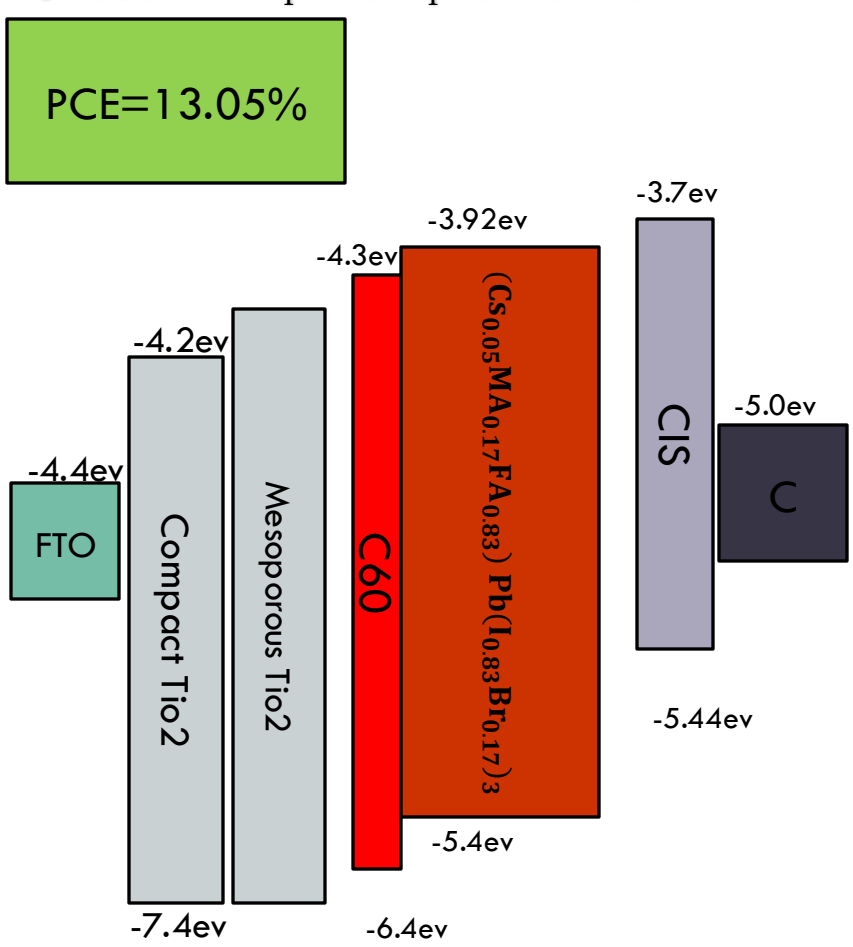
Spin-coating VS Thermal evap deposition of C60

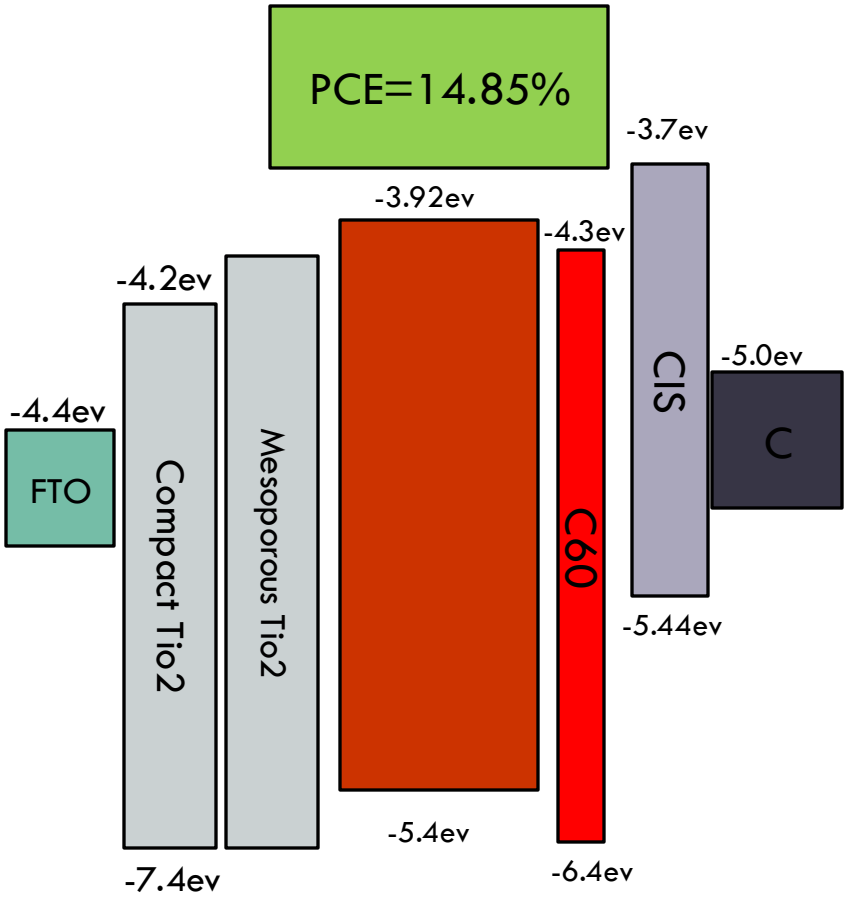


Our work

We apply Fullerene (C60) in three different situations

- As interlayer of ETL/Perovskite layers
- As interlayer of perovskite/HTL layers
- Bare complete perovskite cell





Thank you for your attention