

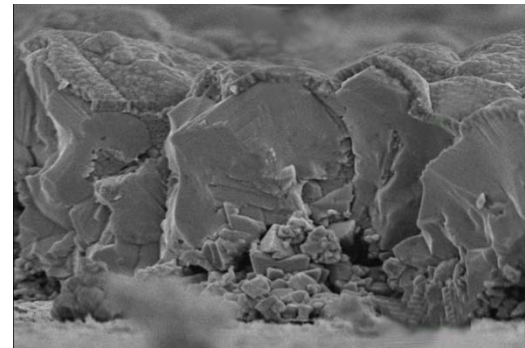


## PHOTOVOLTAIC SOLAR ENERGY

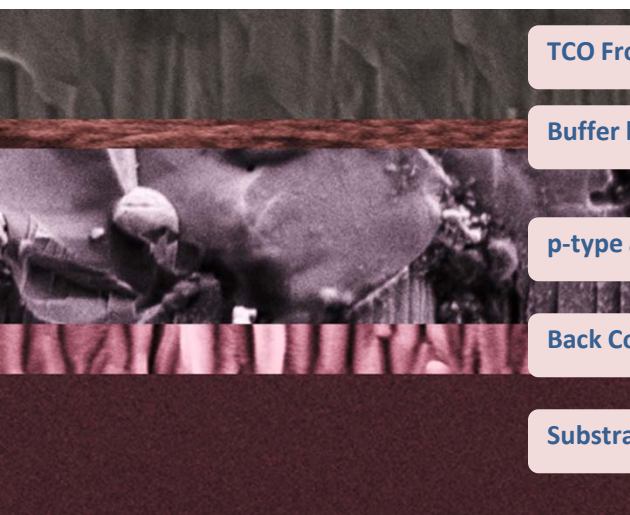
Research and development of **thin film solar cells** on different type of substrates to increase device efficiency and to decrease manufacturing cost in order to gain competitiveness. The activity covers the study of initial materials and all the different production steps being focused on the manufacturing process.

### MATERIALS

- ❖ New chalcopyrite absorbers (CIGS) with high efficiency.
- ❖ Back contact for CIGS and Silicon amorphous solar cells.
- ❖ Transparent conductive oxide (TCOs) with high transmission and low resistivity used as front contact for CIGS and Silicon amorphous solar cells.
- ❖ Buffer layers (semiconductor n-type)
- ❖ Anti reflective surfaces
- ❖ Photocatalytic coatings.
- ❖ Hydrophilic, hydrophobic and biocide coatings for self cleaning surfaces.



### CIGS SOLAR CELL STRUCTURE



TCO Front Contact

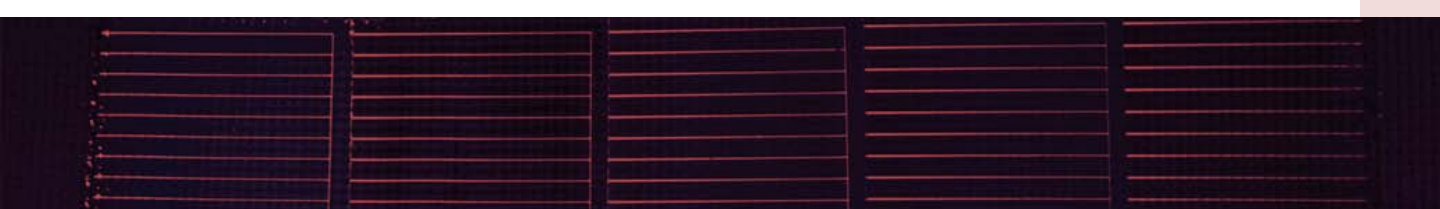
Buffer layer: n-type

p-type absorber layer

Back Contact

Substrate

- ❖ Specialist in development each layer comprising the CIGS solar cells.
- ❖ Study different type of substrates : glass, steel, ceramic and plastic.
- ❖ Optimizing their properties and manufacturing processes to improve device efficiency.
- ❖ All the steps of the manufacturing chain are studied.



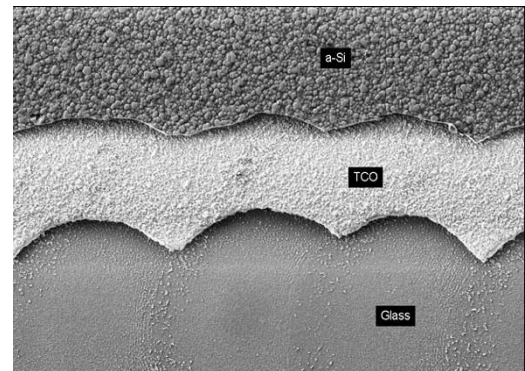
## TECHNOLOGIES

- ❖ Magnetron Sputtering Deposition: Development of process and equipment.
- ❖ Sol-gel and other chemical techniques (CBD) for surface deposition and functionalization.
- ❖ Texturing by UV-Lithography.
- ❖ Laser Technology.



## PROCESSES

- ❖ Development of sputtering and chemical process for deposition of different parts of the thin film solar cells with high industrial yield.
- ❖ Development of Laser selective scribing process with ultra short pulses to interconnect different part of cells and different cells.



## CONCENTRATED PHOTOVOLTAICS

- ❖ Concentrators design.
- ❖ Precision trackers.

