

# Plastic Electronics for Clean Energy

## Background and challenges

### Polymer Photovoltaics

#### Why ?

Low cost  
Printed  
Light-weight  
No need of direct light

#### What for ?

Vertical/curved walls, roofs  
Power for consumer electronics  
Wearable/flexible items  
Hydrogen generation

#### State-of-the-art

Laboratory prototypes: ca. 10 % efficiency  
Low stability: < 5000 hours (encapsulated cells)

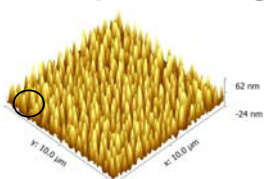
#### Challenges

Improve cell efficiency and stability  
Hydrogen generation without noble metals

## Description and main innovation

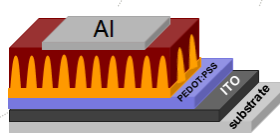
### i. Nanostructured PV cells

#### Nanopatterning



Fabrication of  
**Nanopatterned** layers

#### PV cells fabrication



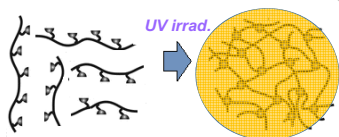
**Cells prototypes** are fabricated and tested.

#### Flexible solar cell



Technology transfer to **flexible** substrates

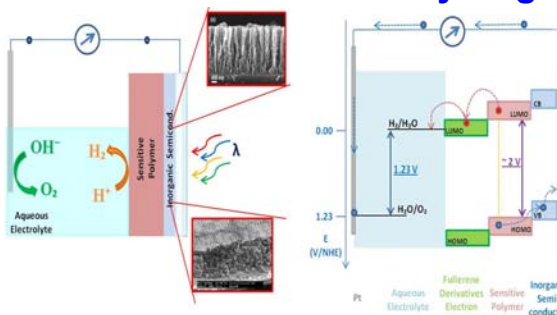
#### PV Materials/Chemistry



Stabilized polymer network

New polymers to  
**stabilize** the solar cells

### ii. Photoelectrochemical cell for hydrogen production



## Achievements

- The developed method represents a low-cost solution to fabricate nanostructured polymer PV - cells.
- Cells of stabilized layers showed enhanced performance stability in comparison with «regular» cells.

#### Projects: (ca. 1.1 M€)

- 4 National, FCT funded: 400 k€
- 1 European-funded project (PHOCS): 396k€
- 1 ITN Marie Curie Network: 216k€
- 1 M-ERA-NET project (FCT funded): 100k€

#### The main achievements have been disseminated in:

- 14 Articles in ISI-listed, peer reviewed journals.
- 2 Articles and 12 oral communications (3 invited) in scientific international conferences.

PhD and MSc theses: 3 PhDs in progress and 6 MSc finished or in progress.