



**Presentation of imec
Eszter Voroshazi,
Leader WG6**



IMEC IN THE WORLD



IMEC IN NUMBERS



- ▶ Imec's staff has grown to 2,086 people
- ▶ Of these, 383 are residents - visiting researchers from partner companies & institutes
- ▶ And 289 are PhD researchers
- ▶ Our staff represents 71 nationalities
- ▶ The average age is 40 years

in 2013

RESEARCH PROGRAMS

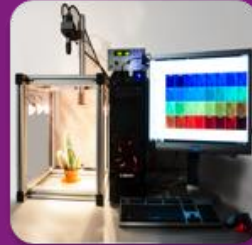
APPLICATION
DRIVEN RESEARCH



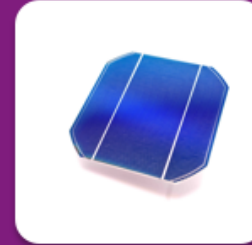
**ELECTRONICS FOR
HEALTHCARE
& LIFE STYLE**



**WIRELESS
COMMUNICATION**



**IMAGE SENSORS &
VISION SYSTEMS**



ENERGY



**SENSOR
SYSTEMS**

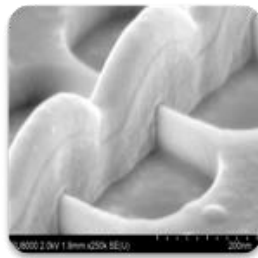
TECHNOLOGY
DRIVEN RESEARCH

CORE CMOS

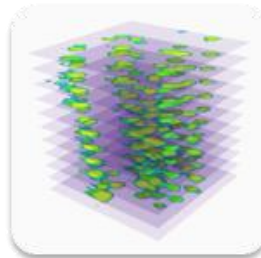
LITHOGRAPHY



DEVICES



INTERCONNECTS



HETEROGENEOUS INTEGRATION

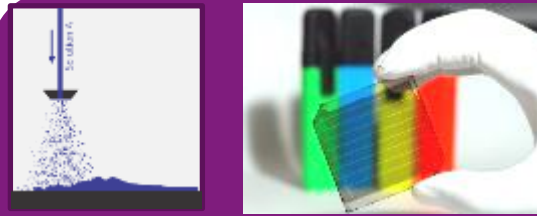
MEMS SENSOR PHOTONICS



FLEXIBLE ELECTRONICS

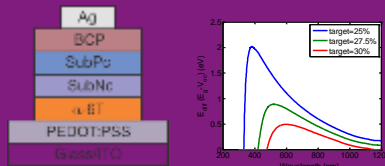


FOCUS OF THE THIN FILM PV GROUP

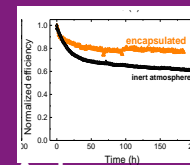


Solution and evaporation based module fabrication and packaging

Sheet-to-sheet process line

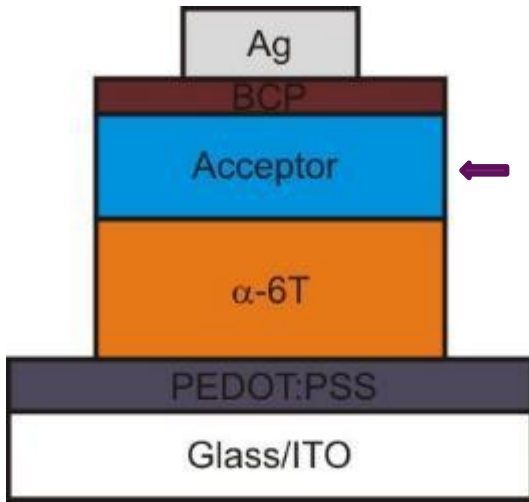


Novel concepts and optical, device and energy yield modelling

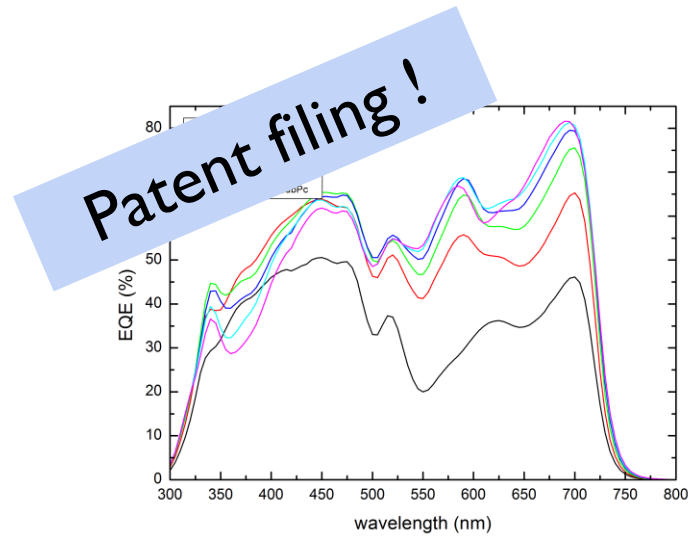


Advanced electrical, material and reliability characterization

Fullerene-free evaporated small molecule cells



C60 fullerene
 Non-fullerene A
 Non-fullerene B
 Non-fullerene C



	V_{oc} [V]	J_{sc} [mA/cm ²]	FF [%]	PCE [%]
α -6T / C ₆₀ fullerene	0.42	4.54	53.5	1.01
α -6T / non-fullerene A	1.09	7.46	57.1	4.65
α -6T / non-fullerene B	0.94	11.47	54.3	5.87
α -6T / non-fullerene C	0.91	14.6	65.0	8.4 !



Highest efficiency ever reported for fullerene-free OPV

RELIABILITY EQUIPMENT



Several chambers:
climate, light soaking with in-situ JV
measurement

SHORT CV

- **Senior Researcher at imec** on O,TF and Si PV reliability, advanced material characterization
- Ph.D. KULeuven working at imec in Engineering
- Thesis title: Degradation mechanism in polymer:fullerene solar cells
- M.Sc. Univ. Rennes in Solid state Chemistry
- M. Eng. INSA de Rennes in Nanotechnology and Materials
- **Expertise and publications:**
 - Organic photovoltaic – Pan Stanford Publishing(ed. Barry P. Rand, H. Richter): – Ch.15
 - E.Voroshazi et al, Adv. Energy Mater., 2014
 - S. Dupont, E.Voroshazi et al., Adv. Funct. Mater, 2014

WG6 GOALS

We aim to:

- define next generation of stable, high efficiency and LCA approved devices based on learning and results from WG3-5

(from substrate → encapsulation)

- lifetime prediction model based on ageing data (accelerated and outdoor data correlation) based on results from WG3-5

We will not work on:

- experiment(s) with not reproducible devices just because it contains new materials (or perovskite)

WG6: NOVEL DEVICES

Novel materials in OPVs for enhanced energy yield*

- Literature review of most stable materials
- Experimental results from WG2-WG5
- Brainstorm session (with industrial partners)

Final goal: Define and test novel generation of OPVs

Define Stable perovskite cells

- Probe interest and capabilities of partners (questionnaire)
- Participation in Round Robin to learn to measure efficiency (in collaboration with ISOS)
- Later (and if reproducible samples and measurements): Device exchange in small working groups

Final goal: Define materials for stable perovskite cells
Project Leader: Francesca Brunetti