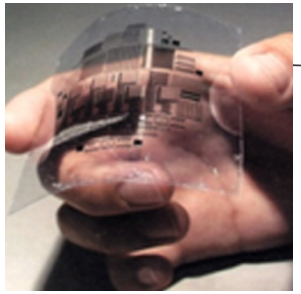
Organic photovoltaics at CSEM

3rd Gen Photovoltaics: CleanTech Day

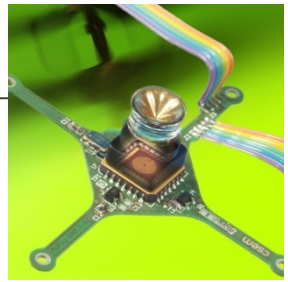
G. Nisato

Basel, 19.08.2009

CSEM Centers in Switzerland

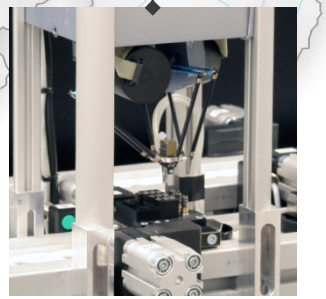


Thin Film Optics



Photonics

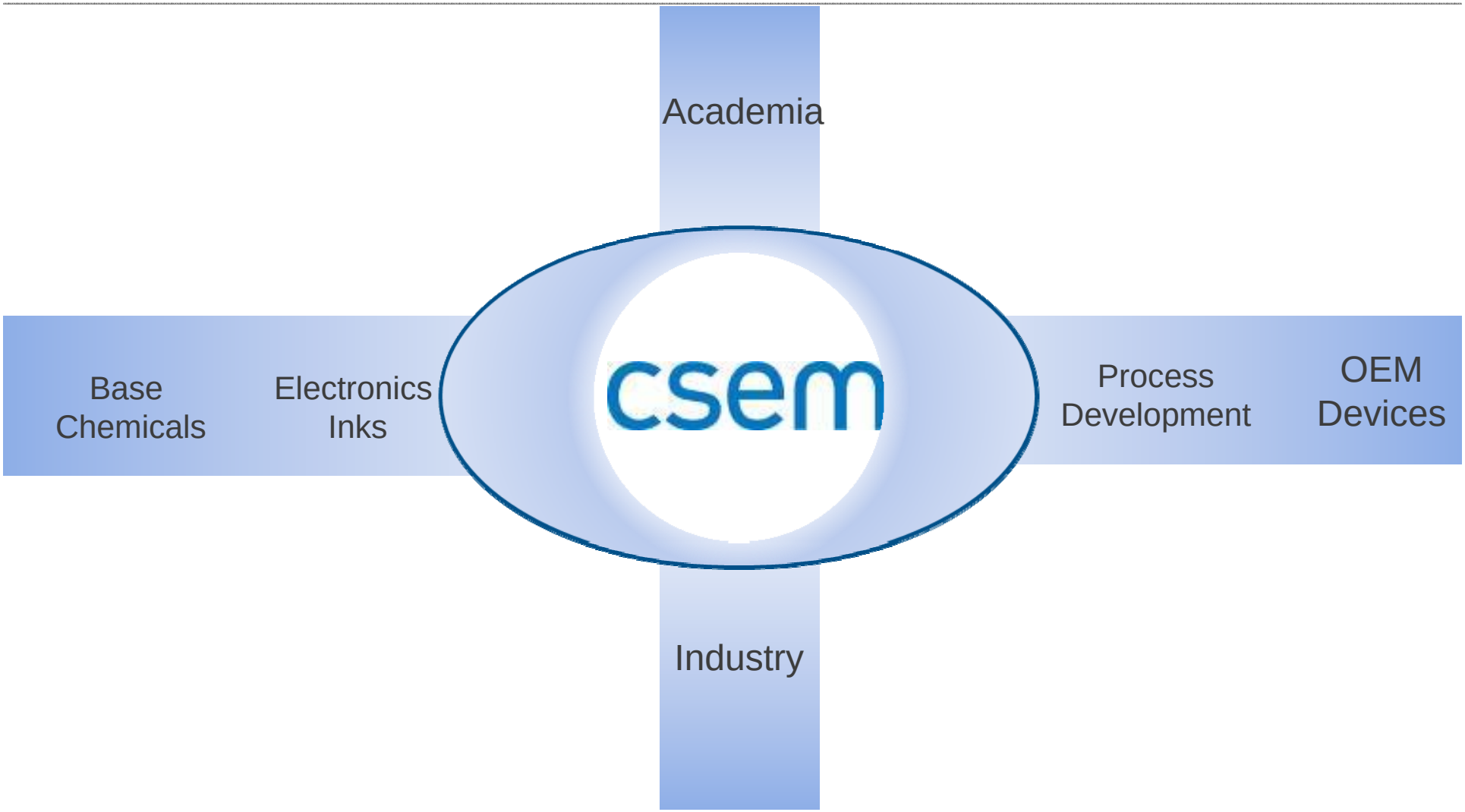
Microelectronics
Microsystems technology
Nanotechnology & Life Sciences
System Engineering
Time & Frequency



Microrobotics

Nanomedicine

Role in organic electronics



Polymer Opto electronics group

- We are: physicists, material scientists, process engineers and chemists, with academic and industrial (IBM, Philips, Roche, Rolic …)

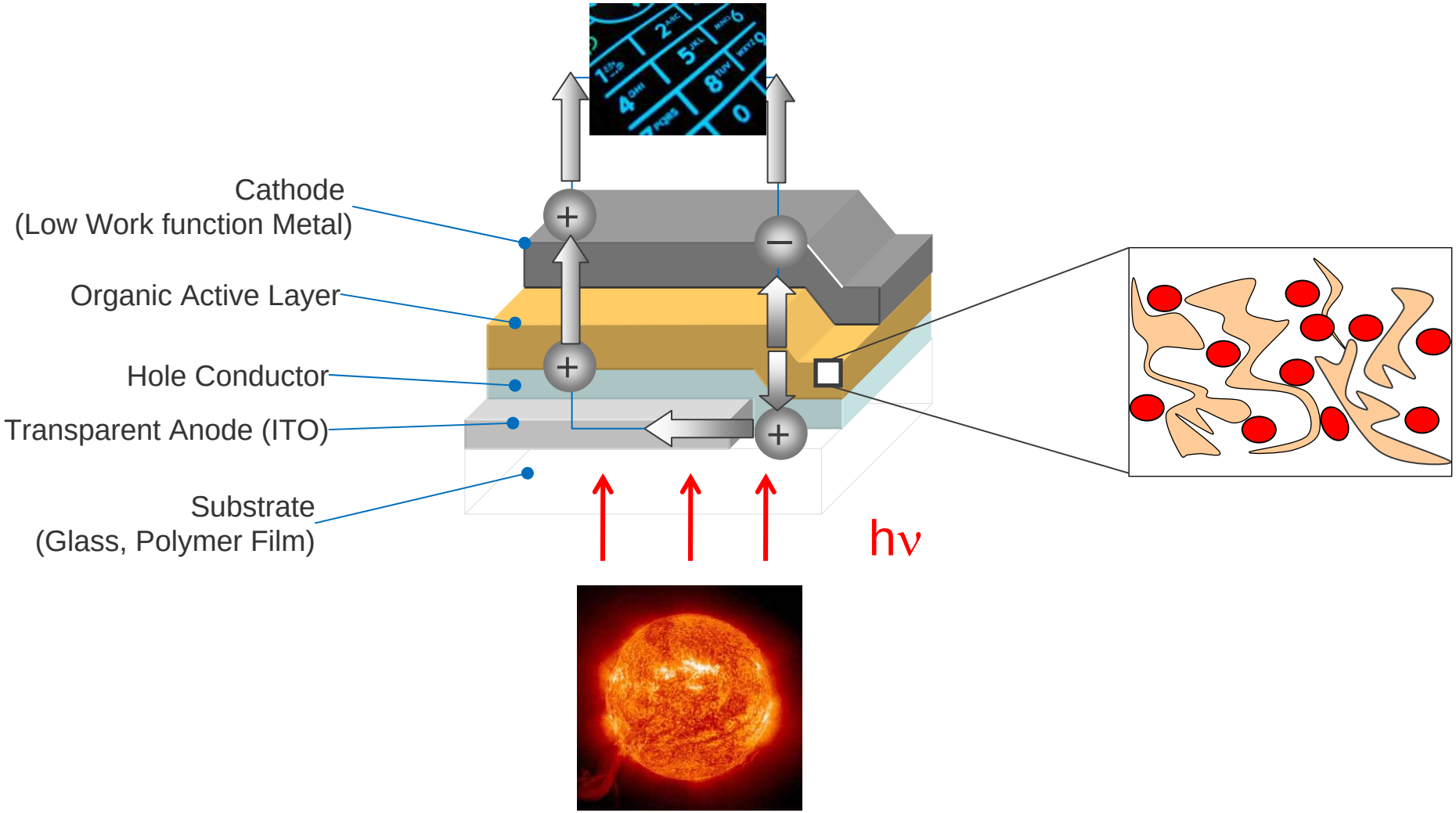
  R&D experience

- We provide: basic materials evaluation, proof of principle / first-of-kind devices, custom R&D methods to our clients on a project basis

Polymer Optoelectronics Facilities

- Class 10k clean room
- 200 m2 lab room (with Thin Film Optics)
- Machine shop, CAD
- Micro lithography
- OLED, OPV, OFET fabrication tools
- Electro-optical characterization tools
- Combinatorial systems
- Lifetime testing
- Printing (IJP)

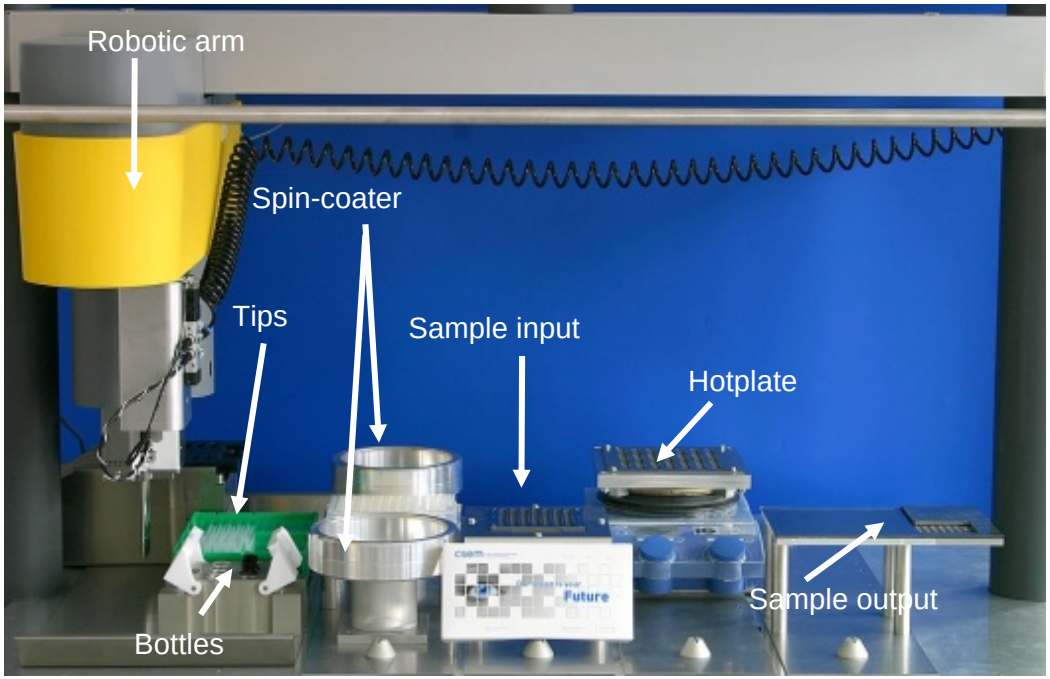
Device Architecture of Organic Photovoltaic Devices



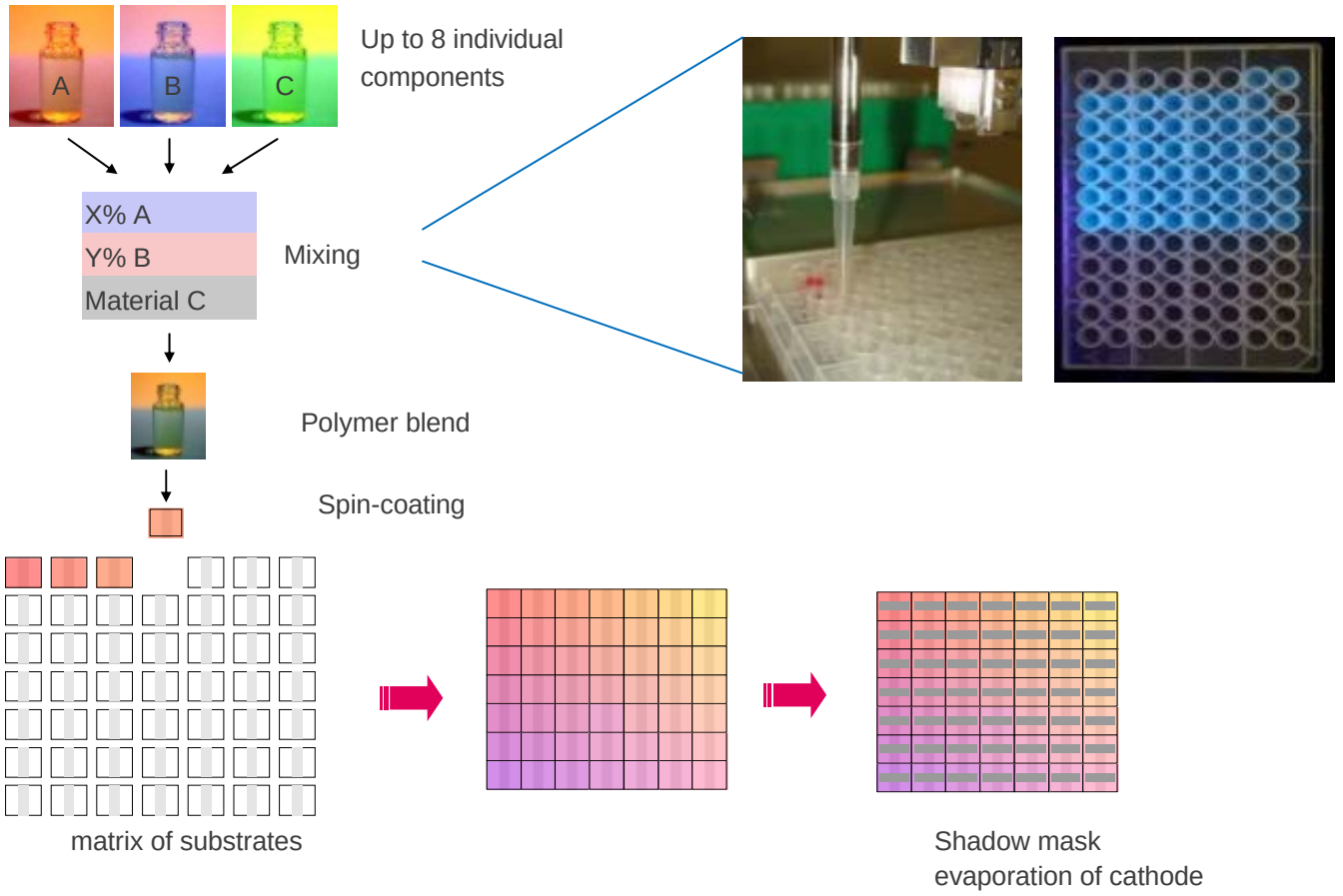
Organic solar cells, fabrication tool

Enables systematic variation of:

- Material composition
- Blend concentration
- Layer thickness (spin coated)
- Annealing temperature & time
- Solution temperature control
- Solution mixing ratio



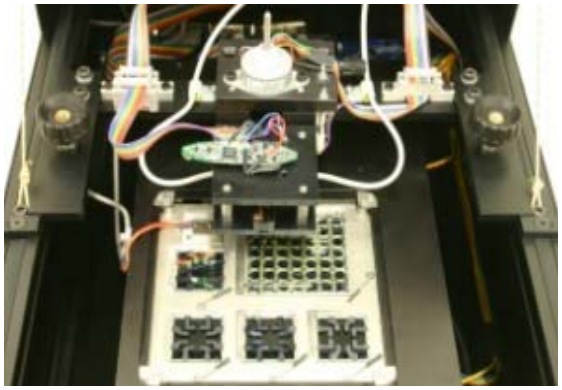
Process flow



Automated characterization

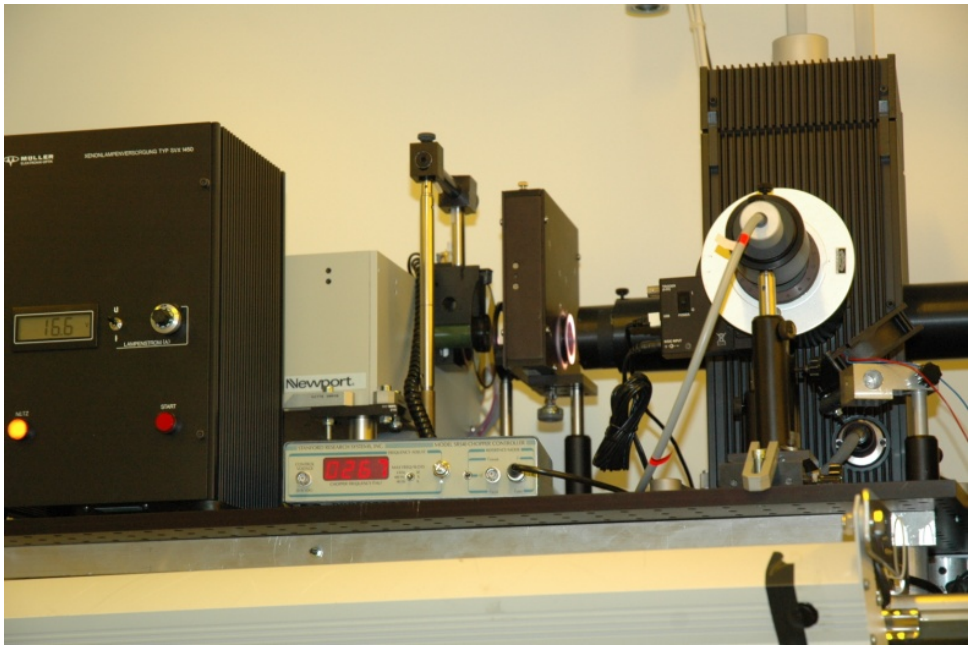
Examples of parameters measured:

- External Quantum Efficiency
- Current-Voltage
- Reflectance
- Electroluminescence
- CCD image of the devices

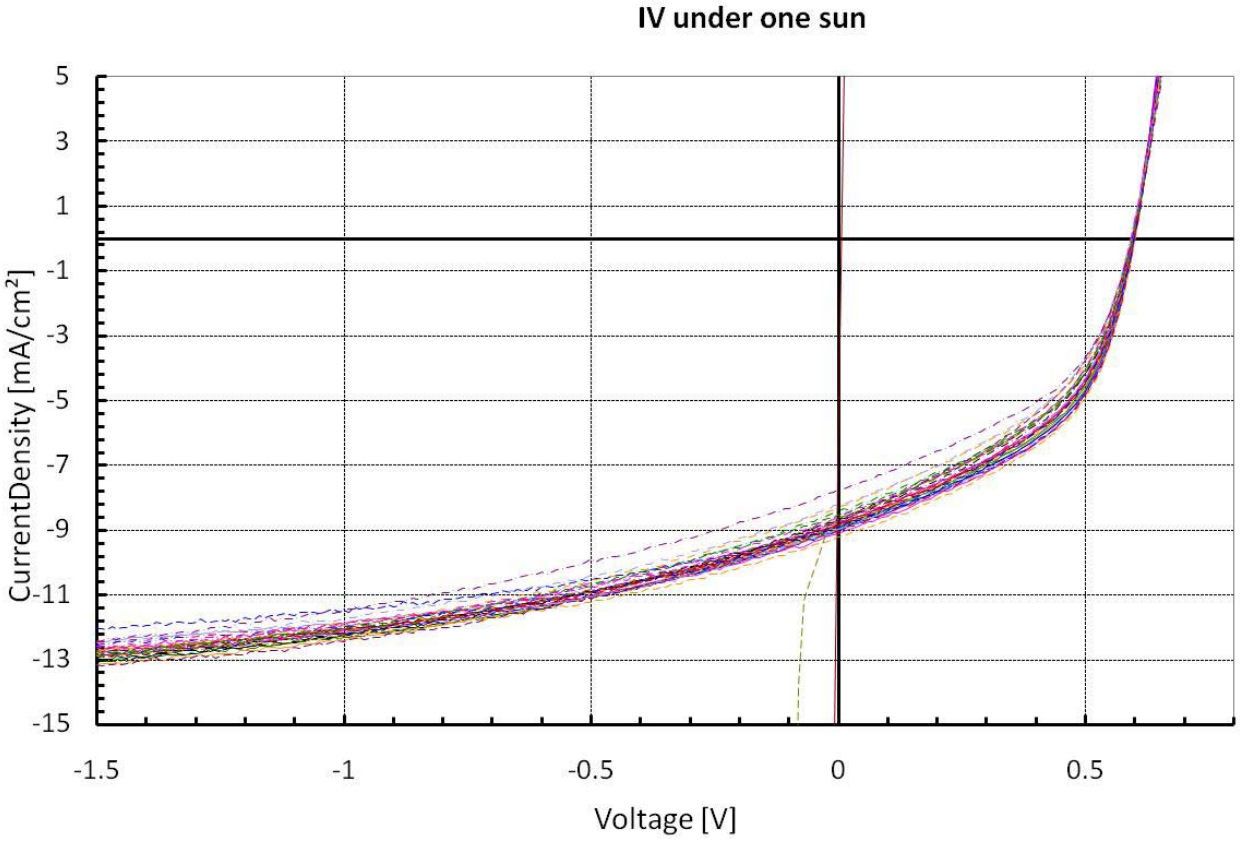


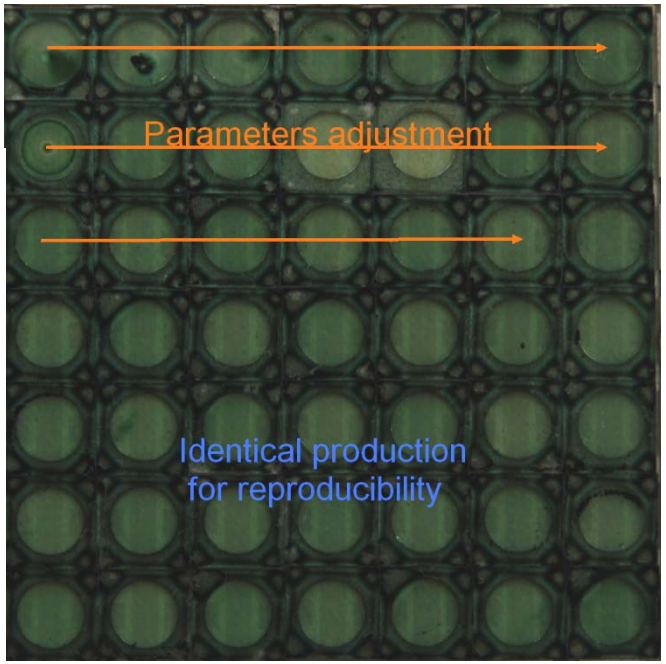
Solar simulator

- Source: Xe lamp
- Simulation: AM1.5g conditions
- EQE under white bias
- Lock-in detection
- Light intensity dependence
- Automated measurement in glovebox



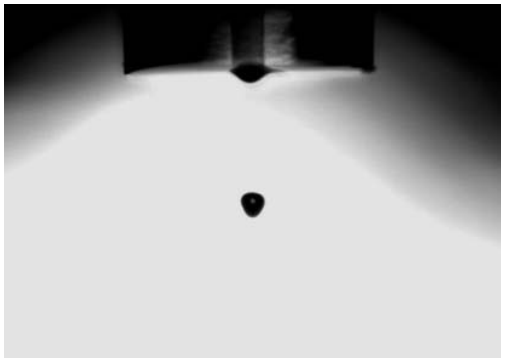
Example of study - homogeneity

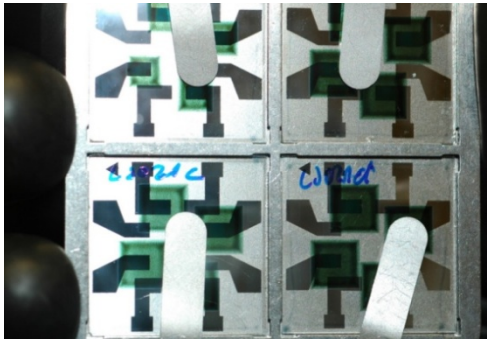




Ink jet printing solar cells

- Ink formulation
- Ink-jet printing parameters
- Cell making and characterization





Framework: ongoing Apollo EU project with
ZHAW, TU/e, UJI and BASF

Polymer Optoelectronics - OPV Capabilities

OPV – solution process, inkjet & testing

Coatings, permeation testing

Combinatorial, high-throughput fabrication and testing

Design & realize dedicated R&D equipment

Acknowledgements

- Ton Offermans

- Guillaume Basset

- Jürg Schleuniger

- David Leuenberger

Thank you for your attention!