



COST

COST Action MP1307

Stable Next Generation Photovoltaics: Unraveling Degradation Mechanisms of Organic Solar Cells by Complementary Characterization Techniques.

3rd MC Meeting and 2nd WG Meeting

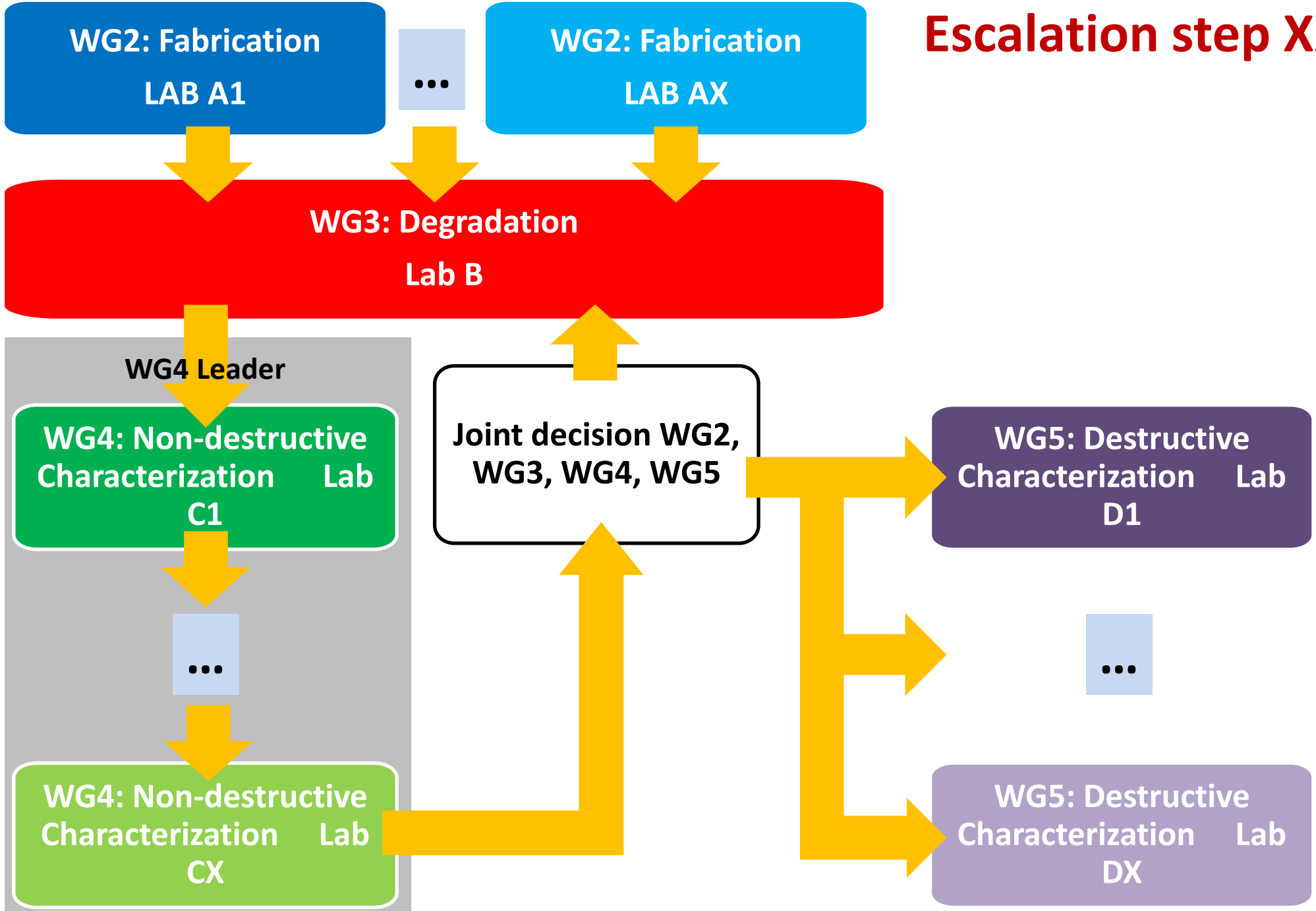
Yulia Galagan

Experiment 4

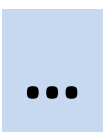
Lille, France, 11th -12th May 2015



Escalation step XX



WG2: Fabrication
LAB A1



WG2: Fabrication
LAB AX

WG3: Degradation
Lab B

WG4 Leader

WG4: Non-destructive
Characterization Lab
C1



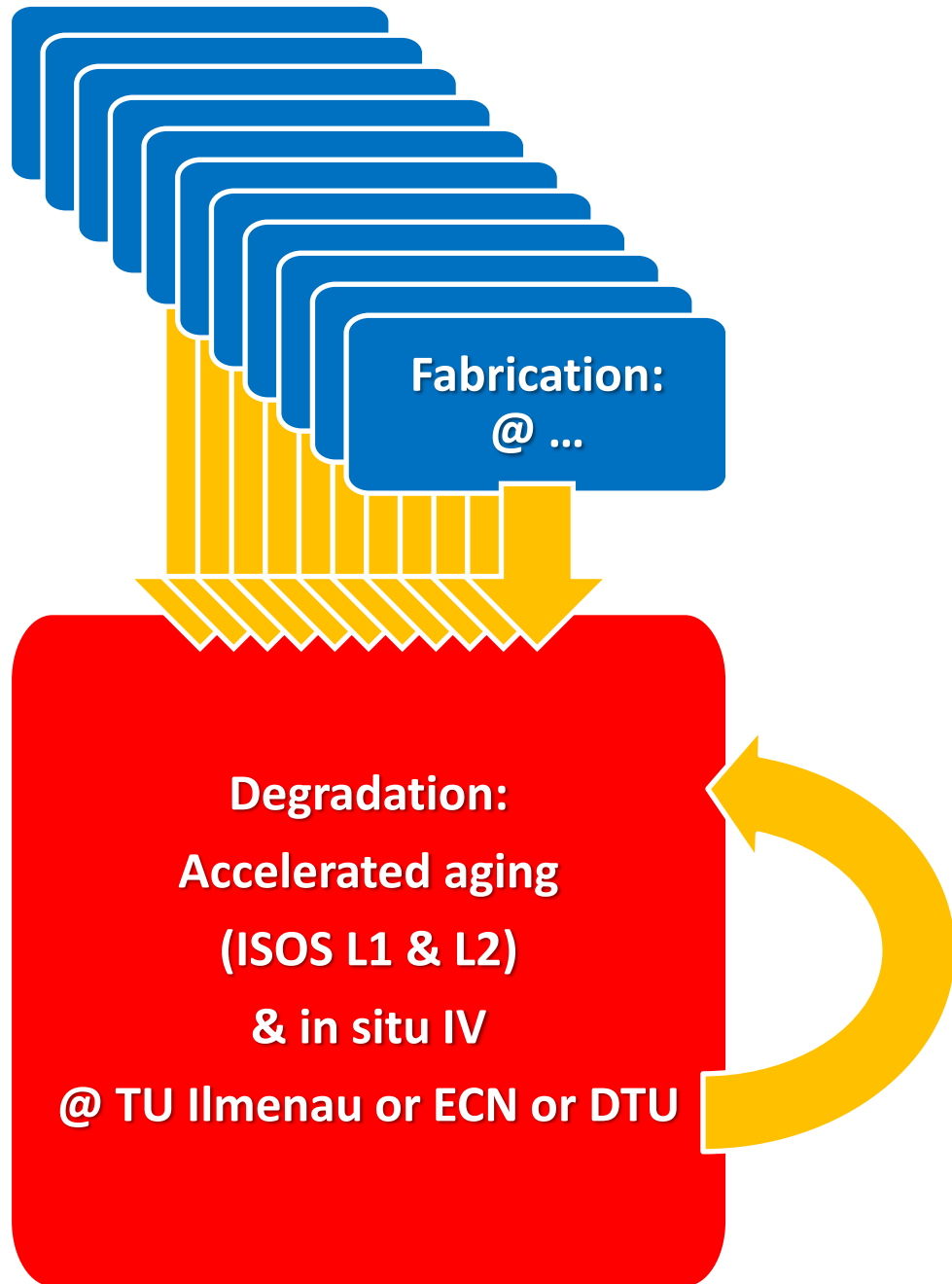
WG4: Non-destructive
Characterization Lab
CX

Joint decision WG2,
WG3, WG4, WG5

WG5: Destructive
Characterization Lab
D1



WG5: Destructive
Characterization Lab
DX





Objectives

- Introduce research groups producing completed encapsulated devices;
- Identify the most critical parameters for each type of devices
- Via comparison, simple hints can be exchanged enabling Cell Producers to improve their general device stability
- Help each other to produce State of the art devices
- Create a number of follow up experiments



Results

- IV-characteristics of many different solar cells over time in a single stability testing setup
- Non destructive imaging of the devices



Task 1:

- Identify the groups willing to provide devices for the experiment

Requirements:

- Provide 5-6 reproducible devices
- Crocodiles or wires connections
- Absorber PCDTBT:C70BM
- Deliver the samples by 1st of September

Potential cells producers

	Institution		Responsible
1	TU-Ilmenau	DE	Harald Hoppe
2	Solliance	NL	Yulia Galagan
3	ICN2	ES	M. Lira-Cantu
4	Instituto de Telecomunicações	PT	Ana Charas
5	CLARET, Bangor University	UK	Jeffrey Paul Kettle
6	Tübitak	TK	Elif Alturk Parlak
7	Wroclaw Research Centre	PL	Filip Granek
8	SPECIFIC, Swansea Univ.	GB	Zhe Li
9	Heliatek	DE	Martin Hermenau
10	DTU	DK	Nieves Espinosa

	Institution		Responsible
11	University of Rome Tor Vergata	IT	Francesca Brunetti
12	Selcuk University (*)	TK	Mahmut
13	IAPP, TU Dresden	DE	Lars Müller-Meskamp
14	Vrije Universiteit Amsterdam	NL	Elizabeth von Hauff
15	TEI of Crete	GR	Emmanuel Kymakis
16	DisaSolar	FR	Charline Arrivé
17	Univ. Rovira i Virgili	ES	Josep Ferré
18	Aristotele Univ.	GR	Spyros Kassavetis
19	CEA	FR	Solen Berson
20	NREL	US	Dana Olson

• Solar Cell Degradation: ISOS Protocols

ISOS Protocols

Dark

[ISOS-D-1](#)

[ISOS-D-2](#)

[ISOS-D-3](#)

Outdoor

[ISOS-O-1](#)

[ISOS-O-2](#)

[ISOS-O-3](#)

Lab. Weathering

[ISOS-L-1](#)

[ISOS-L-2](#)

[ISOS-L-3](#)

Thermal cycling

[ISOS-T-1](#)

[ISOS-T-2](#)

[ISOS-T-3](#)

Solar-ther.-hum.

[ISOS-LT-1](#)

[ISOS-LT-2](#)

[ISOS-LT-3](#)

ISOS-D-1 Shelf

Light source	None
Temperature ^a	Ambient
Relative humidity (R.H.) ^a	Ambient
Environment ^a	Ambient
Characterization light source	Solar simulator or sunlight
Load ^b	Open circuit
Examples	

Reference: Solar Energy Materials & Solar Cells 95 (2011) 1253–1267

ISOS-L-2 Laboratory weathering testing

Light source	Simulator
Temperature ^a	Ambient
Relative humidity (R.H.) ^a	Ambient
Environment ^a	Light only e
Characterization light source	Solar simulator
Load ^b	MPP or open circuit
Examples	

ISOS-L-2 Laboratory weathering testing

Light source	Simulator
Temperature ^a	65/85 °C
Relative humidity (R.H.) ^a	Ambient
Environment ^a	Light and temperature
Characterization light source	Solar simulator
Load ^b	MPP or open circuit
Examples	



Task 2:

- Identify the Aging Labs

Requirements:

- ISOS-D-1
- ISOS-L-1
- ISOS-L-2
- 20-40 devices
- Start the aging on 1st of October

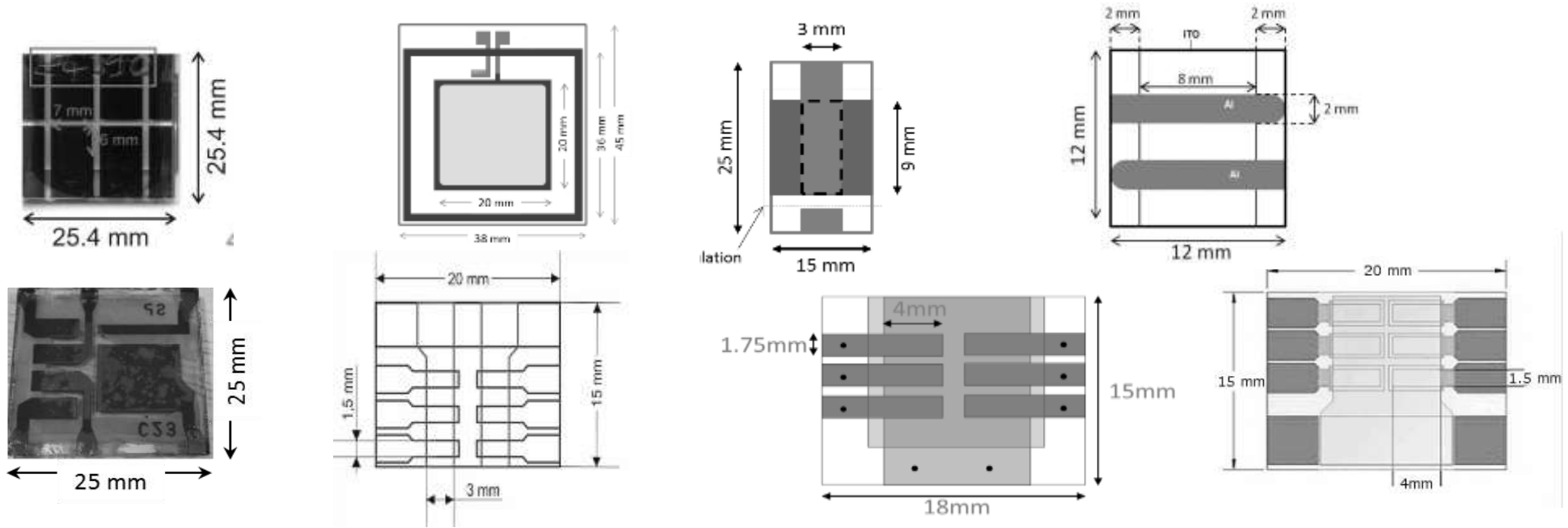


Time critical issues:

- Simultaneous completion of different samples types from one or more producers
- Delivery of samples to initial non-destructive characterization
- Delivery of samples to degradation site
- Delivery ...
- Decision for and delivery of samples to destructive characterization

Handling critical issues

- Unknown samples require more time to adapt measurement procedures
- Low reproducibility in device characteristics harms comparability
- Too many sample types e.g. of different geometry strongly increase characterization times





Action Plan

- Please register your group as a **Cell Produces** (5-6 devices)
- Please register your group as potential **Accelerated Aging Lab** performing ISOS L1 & L2 (20-40 devices)

Contact details for registration:

Yulia Galagan
yulia.galagan@tno.nl



Dates:

- Registration: till 15th of June
- Create DOE and approve with all participants: 15th of July
- Samples preparation and delivery: 1st of September
- Non destructive characteristics (if applicable) : 15th of September
- Start aging: 1st of October



ecocost

Thank you!

