

# PV-MODULE RELIABILITY

APRIL 5–6, 2011,  
BERLIN (GERMANY)

## TESTING ANALYSING SIMULATING



FRAUNHOFER INSTITUTE FOR  
SOLAR ENERGY SYSTEMS ISE

### WORKSHOP REGISTRATION

**Deadline: March 18, 2011**

Company/ Institute:

Full Address:

Name, First Name:

E-mail:

- ☐ I will present a scientific poster (no commercials) with the following topic:
  - ☐ I will present a brief statement (1 slide) in the plenary discussion
- (slide and/or poster to be provided before March 18, 2011)

My preferred discussion groups are

group discussions I: module testing ☐ 1 ☐ 2 ☐ 3

group discussions II: material testing ☐ 1 ☐ 2 ☐ 3

- ☐ registration fee will be paid by bank transfer after receipt of the invoice (deadline: March 25, 2011)
- ☐ registration fee will be paid cash (no credit cards possible) at the workshop

Back to:

Fraunhofer ISE

Sina Friedrichs

Heidenhofstr. 2

79110 Freiburg

Germany

### ORGANISER

Fraunhofer ISE, Michael Köhl

Please contact Sina Friedrichs

(sina.friedrichs@ise.fraunhofer.de) for more information.

### CO-ORGANISER

Humboldt-Universität zu Berlin, Institute of Physics, PBP,  
Prof. Dr. Beate Roeder

### SUPPORTED BY

JRC Ispra, PCCL Leoben,

TÜV Rheinland Group, VDE-Institute

### VENUE

HU Berlin, lecture building, Newtonstr. 14, R. 0'05,

12489 Berlin,

Detailed information will be provided after registration

### RECOMMENDED AIRPORT

Berlin-Schönefeld

### REGISTRATION FEE

250 € (including lunch on both days, beverages during the workshop, dinner on April 5, 2011 at Best Western Hotel, but not accommodation and travel costs)

### RECOMMENDED HOTEL

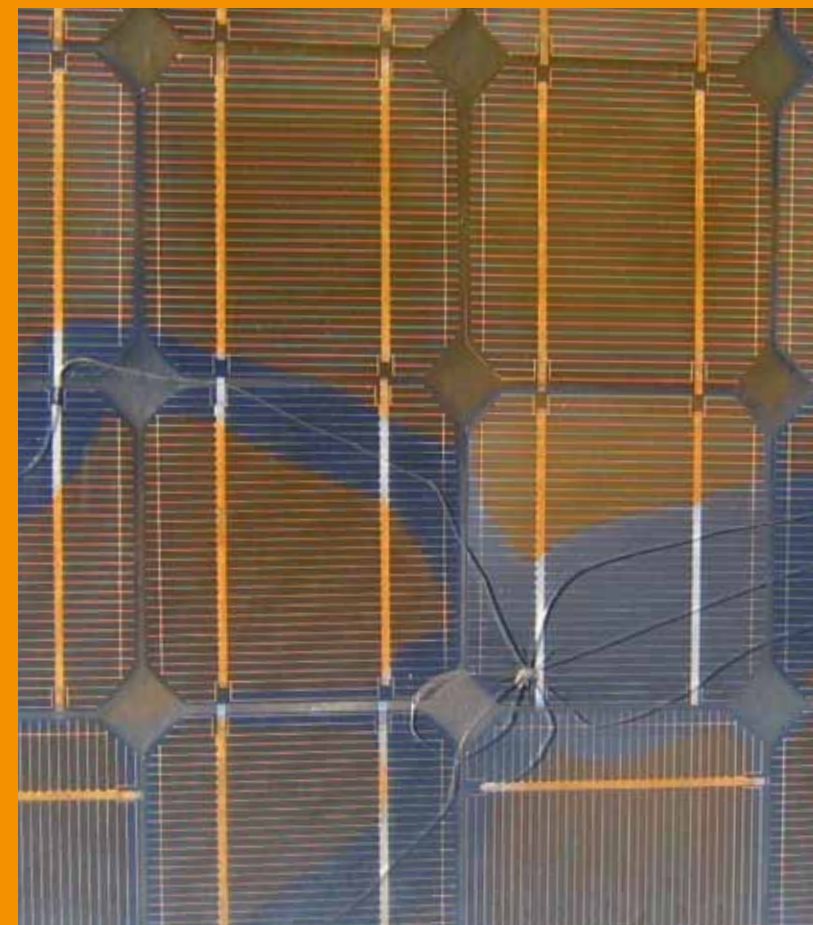
Best Western Hotel Schloss Köpenick Berlin (+49 30 658050),  
refer to block reservation HU (before March 4, 2011)

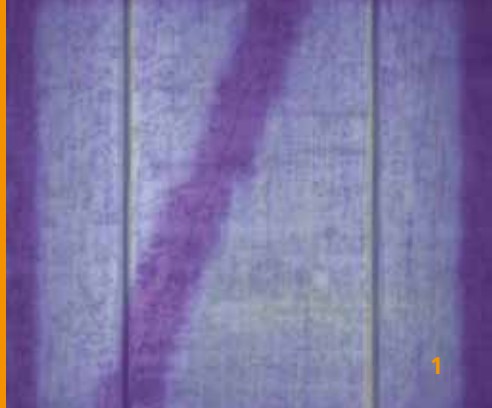
### WORKSHOP – FINAL ANNOUNCEMENT

TESTING – ANALYSING – SIMULATING

## PV-MODULE RELIABILITY

APRIL 5–6, 2011, BERLIN (GERMANY)





## AGENDA

### OBJECTIVES

Description of the state of the art of reliability assessment for PV-modules and of the needs of different stakeholders (material suppliers, module manufacturers, installers and investors)

Evaluation of actions needed for further development of methods for Testing, Analysing and Simulating the PV-Module Reliability

### WHO SHOULD ATTEND

Reliability and R&D engineers of module manufacturers and system installers: Material developers, testing engineers, scientists.

The number of participants will be limited.

### STRUCTURE

The topics listed below are summarized by key-note lectures. Every participant can add a brief statement of one min (1 slide) during the plenary discussion and/ or present a scientific poster (no commercials) during the breaks.

Plenary and group discussions should facilitate and elaborate the actions needed for further development of reliability testing procedures.

**COVER** *Browning and bleaching caused by cracks.*

**1** *Combined electroluminescence and fluorescence image of a cracked cell in a module.*

#### April 5, 2011

09:30 **Welcome**

09:45 **1: REQUIREMENTS FOR THE RELIABILITY AND SAFETY**

(Lifetime, bankability, assurance issues, safety testing)

Christian Scharrer (Münchner RE) and Thilo Strecker (VDE)

10:45 **Break**

11:15 **2: REAL MODULE LIFE**

(Yield of solar systems and yield over time; influence of location) Ralph Gottschalg (CREST) and Michael Köhl (ISE)

12:15 **Plenary discussion**

How should we amend the type approval testing?

- Stronger type approval testing
- Test to failure
- Quality insurance
- Service life testing

13:00 **Lunch break**

14:00 **3: FAILURES**

(Failure modes observed in real use and long-term exposure)

Thomas Friesen (Supsi) and Tony Sample (JRC)

15:00 **4: ACCELERATED LAB TESTING**

(Combined weathering tests, dynamic mechanical stress testing) Bengt Jäckel (Q-Cells) and Werner Herrmann

(TÜV Rheinland)

16:00 **Break**

16:30 **5: POTENTIAL INDUCED DEGRADATION**

(From thin film specific problems to c-Si problems)

Peter Hacke (NREL) and Sebastian Pingel (Solon)

17:30 **Group discussions I: Module testing**

How to design future durability tests

1 Type-approval, 2 Quality-insurance, 3 Service-life

19:00 **Dinner at Best Western Hotel Schloss Koenig Berlin**

#### April 6, 2011

09:00 **Reports from the group discussions**

09:30 **6: MATERIAL AND COMPONENT QUALIFICATION**

(Service life modelling of materials, destructive failure analysis, material qualification)

Karlheinz Brust (Krempel GmbH) and Gernot Oreski (PCCL)

10:30 **Break**

11:00 **7: NON-DESTRUCTIVE FAILURE ANALYSIS**

(Polymer and cell analytics)

Jan Schlothauer (HU Berlin) and Karl-Anders Weiß (ISE)

12:00 **Group discussions II: Material testing**

How to design future material qualification tests

1 Back-sheets, 2 Encapsulants, 3 Glazing

13:00 **Final Plenary**

Reports from the group discussions, summary and outlook