

## 2019 NIST/UL Workshop on Photovoltaic Materials Durability Agenda

December 12 and 13, 2019  
 Building 101, Portrait Room  
 NIST, Gaithersburg, MD 20899

Day 1: December 12, 2019	
8:00 - 8:30 AM	Continental Breakfast
8:30 - 8:45 AM	Opening Remarks--- <a href="#">Howard Harary, Director, NIST Engineering Laboratory</a> <a href="#">Ken Boyce, Director, UL Energy &amp; Power Technologies</a>
<b>Session 1: General (Chair: <a href="#">Kenneth Boyce, UL</a>)</b>	
8:45 - 9:10 AM	Solar Energy Technologies Office's PV reliability Efforts and Interests ( <b>Lenny Tinker, DOE</b> )
9:10 - 9:35 AM	DuraMat Goals/Accomplishment ( <b>Teresa Barnes, NREL</b> )
9:35 - 10:00 AM	Status of Crystalline Si PERC Solar Cells ( <b>Qi Wang, JinkoSolar, China</b> )
10:00 - 10:25 AM	Fight Global Warming (Climate Change) with Solar Energy + Multi-Storage Resilient Island Nano-grid Smart Home/Building ( <b>John Borland, J.O.B. Technologies</b> )
10:25 - 10:40 AM	Break
<b>Session 2: PV Module Field Survey (Chair: <a href="#">Nancy Phillips, DuPont</a>)</b>	
10:40 - 11:05 AM	Durability of Packaging Material in Globally Fielded PV Modules ( <b>Jared Tracy, DuPont</b> )
11:05 - 11:30 AM	Real-world and Accelerated Degradation of PV Module Backsheets ( <b>Laura Bruckman, Case Western Reserve University</b> )
11:30 - 11:55 AM	Energy yield reductions of PV power plants with c-Si or CIS thin-film PV modules installed in Japan ( <b>Tsuyoshi Shioda, Mitsui Chemicals, Japan</b> )
11:55 - 12:15 PM	Panel Discussion 1 (Chairs: <a href="#">John Wohlgemuth PowerMark Corporation</a> ; <a href="#">Stephanie Watson, NIST</a> )
12:15 - 1:45PM	Lunch and Poster Session
<b>Session 3: Accelerated Laboratory Testing and Linking to Field Performance (Chair: <a href="#">Teresa Barnes, NREL</a>)</b>	
1:45 - 2:10 PM	Climate Specific Accelerated Ageing Tests ( <b>Karl Berger, AIT, Austria</b> )
2:10 - 2:35 PM	Co-extruded backsheets for PV modules: Past approaches and recent developments ( <b>Gernot Oreski, PCCL, Austria</b> )
2:35 - 3:00 PM	Degradation of PERC and AI-BSF Photovoltaic Cells with Differentiated Minimodule Packaging Materials ( <b>Roger French, Case Western Reserve University</b> )
3:00 - 3:15 PM	Break
3:15 - 3:40 PM	Correlating Accelerated Testing to Field Defects in Backsheets: Inner and Outer Layer Cracking and Delamination ( <b>Kaushik Roy Choudhury, DuPont</b> )
3:40 - 4:05 PM	Advancing Reliability Assessments of Photovoltaic Modules and Materials through Combined-Accelerated Stress Testing ( <b>Michael Owen-Bellini, NREL</b> )
4:05 - 4:30 PM	Solder Bump Coupon Testing of Backsheets for Simplified Comprehensive Evaluation ( <b>Mike Kempe, NREL</b> )
4:30 - 4:50 PM	Panel Discussion 2 (Chairs: <a href="#">David Miller, NREL</a> ; <a href="#">Ralph Gottschalg, Fraunhofer CSP</a> )
5:00 PM	Adjourn/NIST Labs Tour ( <b>NIST SPHERE; Net-Zero Energy House</b> )

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Day 2: December 13, 2019	
7:45 - 8:15 AM	Continental Breakfast
<b>Session 4: Characterization and Modeling (Chair: Tadanori Tanahashi, AIST; Xiaohong Gu, NIST)</b>	
8:15 - 8:40 AM	Fragmentation Test for Assessing Backsheet Cracking Propensity ( <b>Xiaohong Gu, NIST</b> )
8:40 - 9:05 AM	Multi-scale, Multi-physics Modeling Capabilities towards Improving PV Reliability ( <b>Ashley Maes, Sandia National Laboratories</b> )
9:05 - 9:30 AM	Demonstrating New Concepts for Reliable Low-Cost Module Encapsulation and Moisture Barrier Technologies ( <b>Reinhold Dauskardt, Stanford University</b> )
9:30 - 9:55 AM	Measurement, Modeling and Database of Solar Irradiance ( <b>Aron Habit / Manajit Sengupta, NREL</b> )
9:55 - 10:10 AM	Break
10:10 - 10:35 AM	Corrosion-induced AC Impedance Elevation in Crystalline Silicon Photovoltaic Cells/Modules ( <b>Tadanori Tanahashi, AIST, Japan</b> )
10:35 - 11:00 AM	Degradation and Stability of Polymers: The Role of Aggregation Structure and A New Stabilization Method ( <b>Guangxian Li, Sichuan University, China</b> )
11:00 - 11:25 AM	Statistical Modeling for Service Life Prediction of PV Materials ( <b>Yili Hong, Virginia Tech</b> )
11:25 - 11:50 AM	Physics-Based Machine Learning to Enable Reliable Modules & Sustainable Solar Farms ( <b>Muhammad Alam, Purdue University</b> )
11:50 - 12:15 PM	Panel Discussion 3 (Chairs: <b>Qi Wang, JinkoSolar; Gernot Oreski, PCCL</b> )
12:15 - 1:30 PM	Lunch
<b>Session 5: Link Research to Standards (Chairs: Steve Hogan, Hogan Renewable; Coleen O'Brien, UL)</b>	
1:30 - 1:55 PM	Risks Embedded in the Current Quality Assurance Scheme in the PV Industry ( <b>Ralph Gottschalg, Fraunhofer CSP, Germany</b> )
1:55 - 2:20 PM	Revision of the PV Module Qualification Standard (IEC 61215) ( <b>John Wohlgemuth, PowerMark Corporation</b> )
2:20 - 2:55 PM	Approaches to Component Reliability in IEC Standards Development ( <b>Nancy Phillips, DuPont</b> )
2:55 - 3:10 PM	Break
3:10 - 3:35 PM	Round-robin Verification of Specimen Temperature during Accelerated Testing for the PVQAT TG5 Studies ( <b>David Miller, NREL</b> )
3:35 - 4:00 PM	Recent Progress and Results from IECRE Activities ( <b>Steve Hogan, Hogan Renewables</b> )
4:00 - 4:25 PM	PV Module Safety and Performance Standard Requirements in Extreme Environmental Conditions ( <b>Colleen O'Brien, UL</b> )
4:25 - 4:50 PM	Panel Discussion 4 (Chairs: <b>Mike Kempe, NREL; Karl Berger, AIT</b> )
4:50 - 5:00 PM	Summary and Adjourn ( <b>Kenneth Boyce, UL &amp; Xiaohong Gu, NIST</b> )