SAND2018-9319C

Discover, Develop, and De-Risk module materials, architectures, accelerated testing protocols,data analytics, and financial models to reduce the LCOE of solar energy

Capability 5: Field Deployment for Reliability

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SAND2018- C

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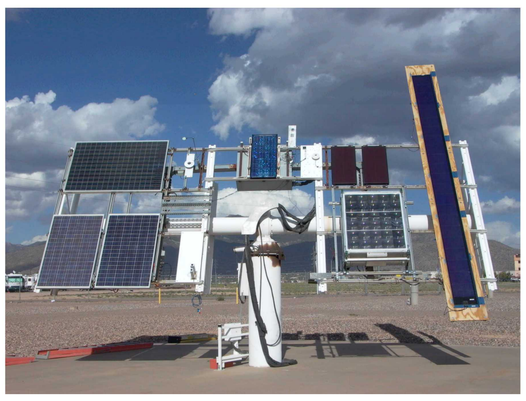
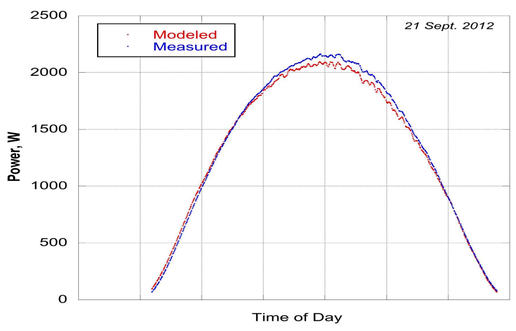
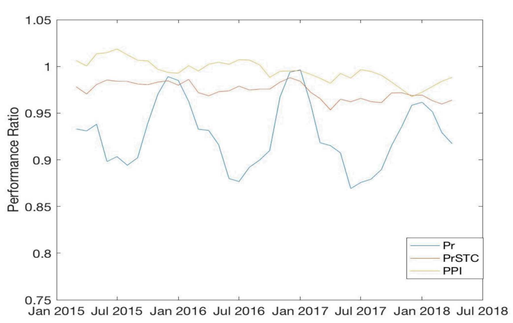
Fielded PV Systems Research





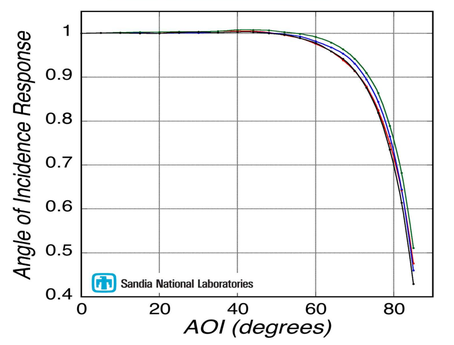


- Tracker Testing - Full electrical performance (IV curves, temperature coefficients, angle of incidence)
- System Instrumentation - DC Voltage and Current, In-situ IV curves, local irradiance
- Combine measured PV system performance with modeled power predictions
  - Evaluate system reliability and degradation rates
  - Evaluate technology improvements
  - Validate energy yield calculations

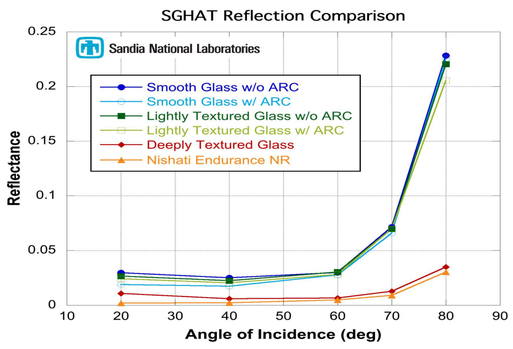
Emerging Technology Characterization Examples

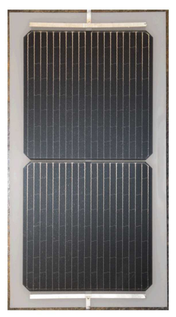
Roofing Products - BIPV

Influence of Coatings on Angle of Incidence



Optimization of Novel Packaging Methods





Component Research

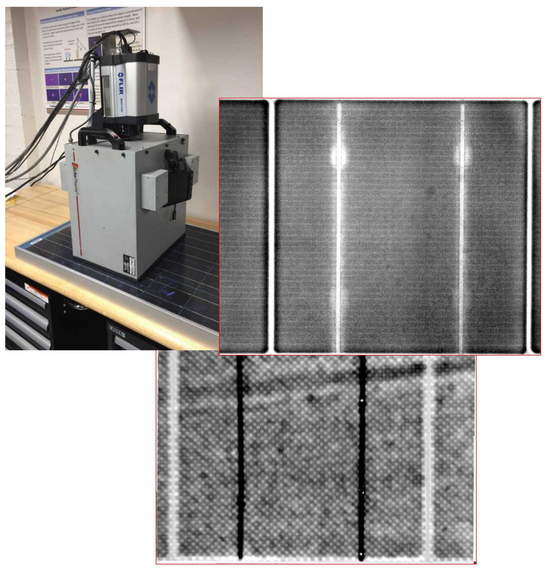
Anti-soiling/Anti-reflective Coatings

- DuraMat BAPVC Project – CUNY/NREL
- Late Q4F18

- Evaluate materials and component reliability and degradation rates
- Flexible, stand-alone platforms at any orientation
- Two-axis tracker installations for maximum sun exposure
- Supported by comprehensive weather data
  - Irradiance, spectrum, temperature, humidity, etc.
  - Planned addition of UV radiometers to better support degradation studies, Q1FY19

Connector Reliability Study

Non-destructive Fielded Module Evaluation Capabilities

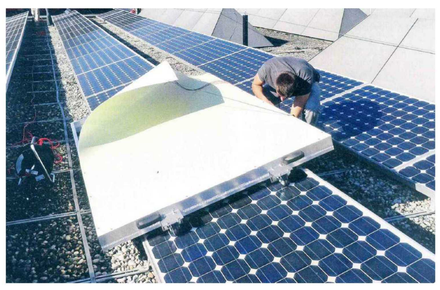


Flash Thermography

- Cells, gridlines, bus bars are easily visible
- Difficult to image thin-film modules
- Equipment is not easily portable, not sized well for full-size modules, throughput is low.
- No further work planned

Field LED Flash Tester

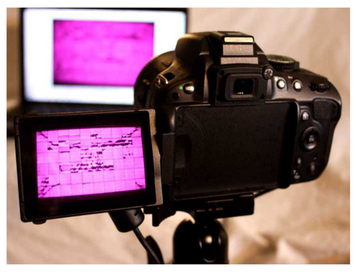
- LED simulator for in situ IV characterization
- Full-size, up to 72-cell modules
- AAA
- 30 m/s pulse
- Expected delivery FY19



Infrared (IR) Imaging (existing capability)

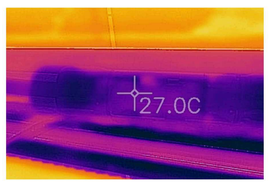
- FLIR A6700 Mid-Wave IR camera for high end inspection (1-5 μm)
- FLIR One Long-Wave IR for quick inspection (8-14 μm)

Field Electroluminescence

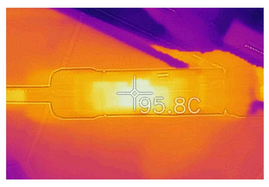


- Acquired fieldable EL camera from Brightspot Automation (7/18)

Module Hotspot



Normal Connector



Failing Connector

Additional Capabilities under consideration:

- Hand-held FTIR (commercial)
- Flash/Reflected UV imaging (under development)

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