**Introduction**

- PV modules are required to service in different types of environment
- Backsheet works as weathering barrier and protects human being from electric shock
- Polymeric backsheet is vulnerable to UV light, moisture, thermal cycle and other degradation factors
- Study the degradation mechanisms of kinds of commonly used backsheet
- Develop the degradation predictive model
- Based on both real-world and lab exposure and characterization
- Cross-correlation of outdoor and indoor degradation behavior and mechanisms
- Using indoor degradation model to predict backsheet exposed to outdoor conditions

**Technology**

- Non-destructive evaluations:
  - Colorimetry
  - Gloss meter
  - Fourier transform infrared spectroscopy
  - UV-Visible Spectroscopy
  - Profilometer: crack quantification
- Destructive Test:
  - Tensile test
  - Cantilever beam test
  - V-peel test
- Data management:
  - High Performance Computing (HPC)
  - SLURM Job
- Data Analysis:
  - Rstudio: "sgSEM", "segmented", "MCMCglmm" packages ...

**Output**

- Development of predictive and semi-gSEM models of backsheet degradation under multi-factor accelerated weathering exposure, Society of Plastic Engineers, Antec, 2016
- Backsheet: Correlation of Long-Term Field Reliability with Accelerated Laboratory Testing, NREL PVRW, 2016
- Photovoltaic module backsheet degradation and differential exposure conditions due to site design, NREL PVRW, 2016
- Stress/Response Degradation Model of Photovoltaic Modules Exposed in Different Climatic Zones, NREL PVRW, 2017
- Degradation Models of Photovoltaic Module Backsheets Exposed to Diverse Real World Condition, PVSC, 2017
- Correlation of Outdoor and Indoor Exposure of PV Module backsheet with AAA Material, PVSC, 2017

**Future Work**

- Continue looking for more field modules that expose to different climatic zones
- Conduct field survey at additional sites
- Start three new indoor exposures
- Non-destructive and destructive evaluations on new obtained retrieved submodules and indoor exposed coupons
- Incorporate effect of humidity and real weather data, and improve degradation model

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