



FLORIDA SOLAR ENERGY CENTER*

Creating Energy Independence

Philosophy, Strategy, Activities and Plans of Task Group #8: Thin Film PV Module Reliability

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Task Group Focus and Activities

- ☀ Task Group #8 Thin Film PV Module Reliability focuses on thin film specific issues that are not covered by c-Si related task groups are provided in the next slide.
- ☀ The group is trying to develop an appropriate accelerated stress test or test sequence for predicting and assuring long term field performance.



Thin Film Specific Issues

- ☀ **Semiconductor Junction:** Diode quality degradation by diffusion of impurities.
- ☀ **Microdelamination:** “micro” delamination of TCO / Mo films as well as macroscopic delamination of structural components such as encapsulant, edge seal etc.
- ☀ **Monolithic Integration:** Increased shunting at scribe lines, poor edge delete leading to ground faults.
- ☀ **Flexible Modules:** Front transparent polymer coversheet, etc.



Strategy

- 1. Field Inspection:** Identify field failure modes, Use I-V measurements, visual inspection and EL/IR imaging whenever possible.
- 2. Failure Mode Analysis:** Statistical analysis of field inspection data to understand impact of each failure mode on module degradation.
- 3. Failure Mechanism Determination:** Probing down to the materials level to decipher the failure mechanism.
- 4. Development of Accelerated Tests:** Based on the failure mechanisms, designing accelerated tests to replicate the observed field failure modes.



IEC Ratings System Proposal

- ☀ It is essential to determine whether the newly defined IEC test sequences will require modifications to cover thin films specific stressors that would influence the failure modes.
- ☀ Therefore, subgroups have been assigned to investigate various failure modes specific to thin-film module.

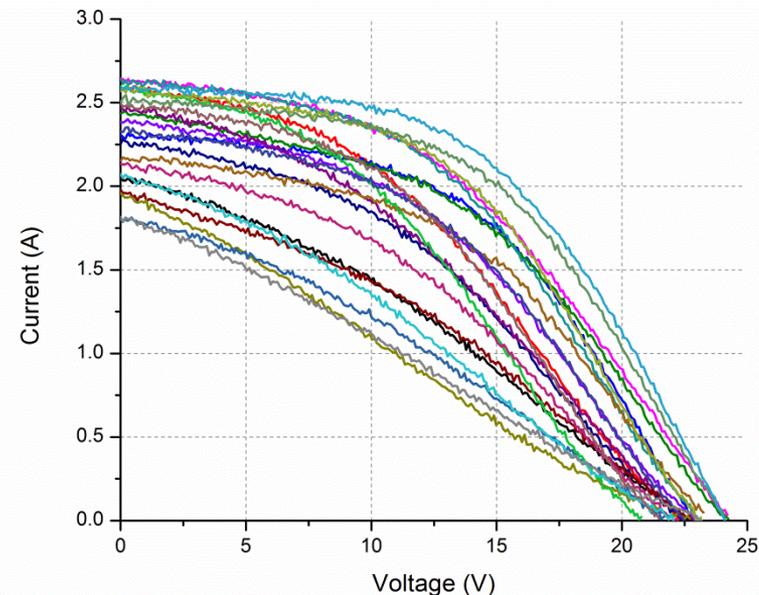


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Collection of Field Data

- ☀ An effort to collect field data from thin-film PV systems is essential to identify the significance and occurrence of various failure mechanisms.
- ☀ Detailed analysis is required to allow for a quantitative analysis. This includes visual inspection, I-V characteristics and if possible electroluminescence and thermal imaging.



IEC Qualification Tests

- ☀ The recent proposal to develop replacement of the IEC61636 should not be based initially on cell materials such as CdTe, a-Si:H and CIGS.
- ☀ It should be based on thin film specific issues such as Semiconductor Junction, Microdelamination, Monolythic Interconnection, and Flexible Modules.
- ☀ Material specific issues would be considered in the second iteration.



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Thank You!

☀ Questions and Comments?

