**Notes from first morning of the International PV Module QA Task Force: Thin-Film Task Group Kickoff Meeting**

Abound's observations were:

1. Abound observed a reliability issue with the busbar connection. To detect this problem they found that thermal cycling worked well – but they didn't know how to specify the requirements for the tape. A reverse bias current helped to identify this during the manufacturing.

They found that it was essential to test the module performance at hot temperatures. When the module is hot, the tapes would lift, then the tapes would function at room temperature. The thermal cycling should be done under current - with monitoring of the current, the problem may be identified during the thermal cycling.

2. Potential-induced degradation. The system voltage caused degradation at the scribe lines. Any test is better than no test to detect this problem. The degradation could be reversed. When the cut is made through the transparent conductor (TCO), Na can come through and go straight into the P1 scribe, giving a photoconductive shunt.

3. There was degradation in the semiconductor material itself.

To address this, one needs to know: Where is the Cu, where is it going, where is it coming from?

Partial shading of thin-film modules can stress individual cells. It is very difficult to protect against this.

The IEC test doesn't address the power loss from this. Can see this for any thin-film technology. Might not see it in the field, but the damage can occur instantaneously and then may be permanent.

Dopant change in the field. We need a light-exposure test tailored for thin film. After light exposure, the low-light performance should be checked. The low-light performance degrades first for some thin-film modules.

Would like to extend the understanding to a flex module. Do we have a flex test for flex modules?

All of the degradation mechanisms are things that can be accelerated when a module is flexed.