EXPLORING PID TESTING PROCEDURES OF CIGS PV MODULES

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In order to ensure longer lifetime of photovoltaic (PV) modules, new accelerated test standards are being developed under IEC Technical Committee 82. Among the developing/developed test standards, damp heat testing in dark is widely employed to test the module durability. However, in the field, high temperature is usually accompanied by light irradiation. This difference can invoke a degradation not observed in fields [1]. To explore suitable test conditions that better simulate performance in the field, effects of light irradiation during potential induced degradation (PID) test were investigated on CIGS PV modules. Modules were first stabilized by light soaking (LS, 63 kWh/m²) by metal-halide lamps, followed by PID testing for 96 hours at +1000 V relative to the grounded frame under damp heat (85°C / 85% r.h.) condition. The light source used for irradiation was white LED (blue+yellow) with an intensity of 200 W/m². After PID testing, the modules were stabilized again by LS.

Maximum power ($P_{\text{max}}$) of the modules that underwent PID test in dark decreased more than 25% after the PID test, then recovered to >97% by LS. On the other hand, the module that underwent PID test under light irradiation showed only around 2% of decrease in $P_{\text{max}}$, and fully recovered by LS. This result suggests that PID testing of CIGS modules may require a test condition closer to the field.

Figure 1: Environmental chamber with light (left), schematic diagram of PID testing with light (right).

Figure 2: Effect of light irradiation during PID test. Irradiation during each post-LS is 10 kWh/m².