A SOLAR TRACKING SYSTEM WITH DOWNWARD-FACING STANDBY STATE FOR DRY AREAS

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The radiation received by solar cells within photovoltaic modules is lower than that arriving at the module surface. One of the causes of this energy loss is soiling of the module surface. Therefore, the influence of dust adhesion on photovoltaic modules must be studied.

In this study, we prepared two tracker systems; a new system and a typical system. During the night, the former can switch to a downward-facing standby state, while the latter assumes an upward-facing standby state. Figure 1 displays photographs of the tracker system that can switch to a downward-facing standby state by rotating every PV module during the night and sandstorms.

The soiling on the polymethylmethacrylate and glass set on the tracker systems with both standby states was evaluated for 20 months in Miyazaki, Japan. Figure 2 displays optical microscope images of the (a) PMMA and (b) glass substrates on the upward and downward systems after 20 months exposure. It is evident that the sample surfaces of the PMMA and glass attached to the upward system are soiled in comparison to those attached to the downward system. The soiling on the surface of the PV systems can be prevented by using the downward tracker system.

By adopting the tracker system with the downward-facing standby state, a direct transmittance that was more-than-5% higher was consistently obtained at 500 nm in both cases with polymethylmethacrylate and glass.

Figure 1: Photographs of the tracker system that can switch to a downward-facing standby state.

Figure 2: Optical microscope images of the (a) PMMA and (b) glass substrates on the downward and upward systems after 20 months of exposure.