

ALBEDO IMPROVEMENT AND WEED PROOF EFFECTS OF A WHITE FOAM GLASS MADE FROM WASTE GLASS

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Bifacial Photovoltaic is a PV that can capture the incident light from the backside of module which is not usually usable. The use of the backside to capture the reflected light from ground improves the power generation of PVs. The white foam glass made from clear waste glass as a raw material is attractive from the viewpoint of waste reusing and white color with high reflectance. In this study, we investigated the effect of albedo improvement and weed proof of the white foam glass by spreading it on the ground.

We spread out the white foam glass on the ground of PV installation site in University of Miyazaki. Figure 1 displays the photograph of 3 months after the foam glass spread. After weeding using a grass cutter, the white foam glass was spread in the area enclosed with the fence on January 26, 2017 (1st spread). The depth of the spread white foam glass was 5 cm. On February 24, 2017 (2nd spread), the area in 1.5 m on the south and west sides outside the fence was dug up 5 cm and the upper layer of soil was removed to completely eliminate the weed seeds and roots. After the removing the upper layer, the white foam glass was spread in the dug up area outside the fence. The depth of the spread white foam glass was also 5 cm. To measure the irradiance which is received by front and back sides of the PV module, the pyranometers were set on the front and back sides of the single crystalline silicon PV module. The ratio of the irradiance of back side to the irradiance of front side (back side irradiance divided by front side irradiance; B/F) was calculated and used as an index of albedo improvement.

In order to assess the effect in long-term, daily B/F is shown in Fig. 2. The effect of the white foam glass to increase the albedo was clearly observed. The averaged B/Fs for one month before the white foam glass spread (December 29, 2016 ~ January 25, 2017), one month after the 1st spread (January 26, 2017 ~ February 23, 2017), and one month after the 2nd spread (February 24, 2017 ~ March 23, 2017) were 0.13, 0.26, and 0.30, respectively.

In the area enclosed with the fence, the white foam glass was spread after just weeding using a grass cutter and a few weeds were observed in this area, as shown in Fig. 1. It is considered that the weed seeds and roots remained below the white foam glass. The white foam glass was spread with the depth of 5 cm and the sunlight cannot reach to the ground below it. So, photosynthesis is obstructed and weeds cannot grow. In the case of the 2nd foam glass spread, the upper layer of the ground was removed to completely eliminate the weed seeds and roots. The new seeds cannot reach to the ground due to the 5 cm depth of the foam glass. Therefore, no weed was observed in the area of 1.5 m on the south and west sides outside the fence (the area of 2nd foam glass spread). Moreover, it is considered that the alkalinity of the white foam glass obstructs the growth of weeds.



Figure 1: Photograph of 3 months after the white foam glass spread.

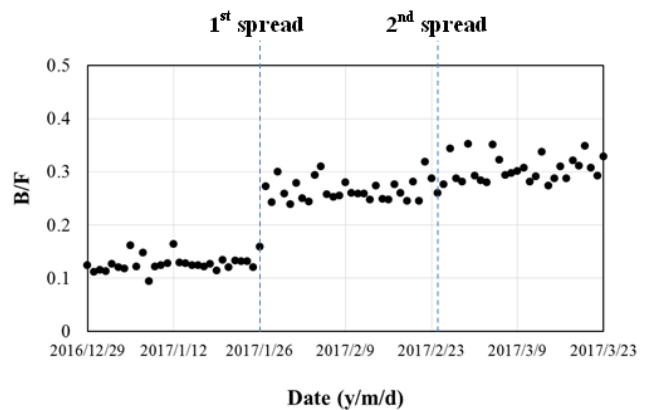


Figure 2: Daily B/F. B/F is a ratio of the irradiance of back side to the irradiance of front side (back side irradiance divided by front side irradiance).