

## Research on the Effect of Accelerated Aging Illumination Mode on Bifacial Solar Modules

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**Abstract :** The design and reliability of solar photovoltaic modules are crucial to the development of solar energy, and efforts are still being made to extend the life of photovoltaic modules to improve their efficiency because natural aging is time-consuming and does not provide manufacturers and investors with timely information, accelerated aging is currently the best way to estimate the life of photovoltaic modules. Bifacial solar cells not only absorb light from the front side but also absorb light reflected from the ground on the back side, surpassing the performance of single-sided solar cells. Due to the asymmetry of the two sides of the light, in addition to the difference in photovoltaic conversion efficiency, there will also be differences in heat distribution, which will affect the electrical properties and material structure of the bifacial solar cell itself. In this study, there are two types of experimental samples: packaged and unpackaged and then irradiated with UVC light sources and halogen lamps for accelerated aging, as well as a control group without aging. After two weeks of accelerated aging, the bifacial solar cells were visual observation, and infrared thermal images were taken; then, the samples were subjected to IV measurement, and samples were taken for SEM, Raman, and XRD analyses in order to identify the defects that lead to failure and chemical changes, as well as to analyze the reasons for the degradation of their characteristics. From the results of the analysis, it is found that aging will cause carbonization of the polymer material on the surface of bifacial solar cells, and the crystal structure will be affected.

**Keywords :** bifacial solar cell, accelerated aging, temperature, characterization, electrical measurement

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