Short Communication

Monitoring of Monocrystalline Silicon PERC Solar Cell with Laser-Doped Selective Emitter Using Infrared and Electroluminescence Imaging

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In this study, a new selective emitter (SE) technology was used in the mass production line for monocrystalline silicon PERC cells. The internal quantum efficiency and series resistance scanning of the SE cells in the early stage of upgrading was examined from the standpoint of test and control, to offer guidance for the most efficient scheme of the new SE technology. The quality risk assessment of the performance of the newly upgraded SE and conventional PERC modules were carried out using infrared thermal imaging, electroluminescence, and other test and control methods, which provides technical support for the automatic detection of defects such as electroluminescence of modules and infrared thermal imaging of power stations. The test results show that if the newly upgraded SE-PERC and conventional PERC cells were mixed to make modules in mass production of PERC line, the electroluminescence uneven light and shade phenomenon will appear in the modules, and were more obvious after light attenuation. The phenomenon of uneven light and dark was caused by the difference of open-circuit voltage or conversion efficiency between the two cells. Through the IR test, the surface temperature of the darkened cell was about 20 °C higher than that of the brightened cell, which will bring a greater risk of a hot spot in the actual use of the module. At the same time, in the process of using the power station, the defective modules were identified by infrared thermal imaging detection, and the defective modules were replaced in time to ensure the normal power generation of the photovoltaic power station.

Keywords: Selective emitter; Passivated emitter and rear contact; Infrared thermal imaging; Electroluminescence; Automatic detection

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