Rate of PID-p Progression in n-PERT Cells Depends on Encapsulant Resistivity and Irradiance

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Abstract:

Power loss associated with potential induced degradation of the polarization type (PID-p) has been observed to occur rapidly, reaching a saturation level of $P_{max}/P_{max}(t = 0) \approx 0.85$ in less than a minute for low resistivity encapsulants under applied voltage.[1] However, subsequent light exposure without bias can result in rapid and quantitative performance recovery.[2] During operation, modules experience voltage stress and illumination simultaneously, resulting in concurrent degradation and recovery phenomena which occur at different rates that are a function of the encapsulant resistivity and level of irradiance.

Here, we report the impact of simultaneous PID and controlled irradiance on the rate of power loss observed in minimodules containing n-PERT cells encapsulated in materials of varying resistivity. For highly resistive encapsulants, a modest amount of irradiance was sufficient to prevent degradation, while for the least resistive encapsulant, even 1 sun irradiance did not prevent power loss. A simple kinetic model is proposed to explain the observed results.

References:

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