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SEM analysis as a diagnostic tool for photovoltaic cell degradation

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Abstract content
   (Max 300 words)

Scanning electron microscopy (SEM)was used as a diagnostic tool for analyzing the degradation of polycrystalline photovoltaic (PV) cells.The main aim of this study is to characterize the surface morphology of hot spot regions (degraded) in photovoltaic cells. In recent years, production of hetero and multi-junction solar cells has experience tremendous growth as compared to conventional silicon (Si) solar cells. Thin film photovoltaic solar cells generally are more prone to exhibiting defects and associated degradation modes. To improve the lifetime of these cells and modules, it is imperative to fully understand the cause and effect of defects and degradation modes. The objective of this paper is to diagnose the observed degradation in polycrystalline silicon cells,using SEM. In this study poly-Si cells were characterize before and after reverse biasing. The reverse biasing was done to evaluate the cells' susceptibility to leakage currents and hotspots formation. After reverse biasing, some cells were found to exhibit hotspots as confirmed by infrared thermography. The surface morphology of these hotspots regions was then characterized using SEM. Preliminary results indicate that hotspots are formed in the regions of high inhomogeneity. Energy dispersion X-ray spectroscopy (EDX) also indicates that these regions have high levels of transitional metals and non-metals. The final paper will provide a detailed analysis of the observed degradation and the surface morphology at the hotspots regions.

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Level for award
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Msc

Main supervisor (name and email)
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