

Polymeric Space Solar Cell Characterization

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Polymeric solar cells offer substantial benefits compared to traditional Silicon and Gallium Arsenide cells for non-terrestrial environments and applications. Their specific power, storage space requirements, and deployment options make them desirable for space related applications. However, even basic optoelectronic characterization of these flexible thin film polymeric cells pose unique challenges. These cells may degrade due to terrestrial environmental exposure and UV irradiation, change efficiency ratings with temperature, and are vulnerable to damage from standard tungsten probes. Therefore, different characterization techniques and instrumentation must be utilized.

Instrumentation, corresponding interface software, and the characterization processes used in the characterization of polymeric space solar cells are discussed. Results on polymeric cells, utilizing both nanotubes and quantum dots, will be presented.

Thin film cells are vulnerable to damage from ordinary wafer probing station tungsten probes.

The specific polymeric cells being produce in the NanoPower Research Labs are superstrate cells which require contacting to the back side of the solar cell.

Many polmeric materials will degrade under UV exposure

Temperature coefficients

Solar cells are tested under air-mass zero (AMO) conditions.

This is in contrast to cells tested for terrestrial use which utilize an AM1.5 spectrum or solar illumination that has passed through one and a half times the earth's atmosphere.

The simulated solar spectrum was provided by two blah blah blah tungsten halogen lamps.

The spectral irradiance was adjusted by varying the dissipated electrical power in the lamps using a variac.

The total illumination was set to 1 sun or 137 W/cm^2 using calibration solar cells provided by the NASA Glenn Research Center.

... a 1 cm^2 GaAs single junction cell which provides 129.6 mA under a 1 sun AM0 illumination.

Labview was used to control a Keithley source measure unit ...

Real time feedback

Automated graphing of results ..

Simple user control over measurement parameters (i.e., ...

Aumotatic determination of Pmm etc.

A discussion of results ... will be presented.