BATTERY POWER NEEDS FOR SPACE APPLICATIONS

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Abstract
In order for photovoltaic energy to achieve grid parity, the levelized cost of energy (the total lifetime cost) must be reduced. This is not possible by addressing only the solar cells since the inverter is a critical weak link in the system. It is well known that aluminum electrolytic capacitors, ubiquitous in power electronic converters, have end-of-life and failure modes that are sensitive to environmental conditions including temperature. In an ACPV system the inverter is mounted on the photovoltaic (PV) module which exposes the capacitors to potentially elevated temperatures which can increase their failure rate. Existing techniques of derating the capacitors increase the cost of the inverter, so they must be applied judiciously. This talk will present a technique to more accurately compute the MTBF of the capacitors used in a PV inverter by utilizing a thermal model of the PV module to predict operating temperature.

Biography
Dr. Judith Jeevarajan has been a Senior Scientist in the Energy Systems Division at NASA-Johnson Space Center in Houston, Texas, since 2003. She has worked on several battery projects using various battery chemistries and also represents the battery group at all the NASA safety panels including the Constellation safety panel, providing technical design and safety guidance for various projects including those with the International Partners. She also carries out advanced battery technology research as part of the Energy Storage Program for Constellation. She teaches a battery course for the engineers involved in battery testing in her organization. She has also written a Chapter on Battery Safety in the IAASS publication "Safety Design for Space Systems". She is also a member of the IEC/ANSI and UL Standards and Test Procedures Technical Working Groups.

From 1998 – 2003, Dr. Judith Jeevarajan worked on-site at NASA-JSC in the capacity of a Senior Scientist in the Battery Group for Lockheed Martin Space Operations, the major contractor at NASA Johnson Space Center for Engineering, Test and Analysis. She was the Battery Group Lead and managed Government Furnished Equipment Battery projects. Batteries were designed and safety certified under her guidance and she was the first to certify and fly a lithium-ion commercial battery in a manned space environment.

Dr. Jeevarajan has a M.S. from the University of Notre Dame, Indiana and a Ph.D. from the University of Alabama, Tuscaloosa, Alabama. Her graduate school work was focused on electrochemistry and her post graduate work focused on battery technology, both of which serves her well in strengthening her current job skills. She has made more than 65 presentations at conferences, has given invited lectures for several organizations, has served as session chair at prestigious conferences and has won many NASA awards including the prestigious Space Flight Awareness award.