

IAF SPACE POWER SYMPOSIUM (C3)
Advanced Space Power Technologies (3)

Author: Mr. ABDELKADER HADJ DIDA
Agence Spatiale Algérienne (ASAL), Algeria, hadjdidaabdelkader@yahoo.fr

MULTI-JUNCTION SOLAR CELLS PERFORMANCE ANALYSIS AND DEGRADATION
PREDICTIONS IN SPACE**Abstract****Abstract :**

At the present, multi-junction solar cells are the main of primary power sources for satellites with the efficiency greater than 30 percent. The rise of the part of spacecrafts power makes the problems of solar cells degradation prediction in space environment conditions to be actual. Solar array performance degradations come from initial degradations at BOL due to tolerances and imperfections of manufacturing , and accumulated degradation over time up to the EOL due to space environment effects. The main type damaging particles on the geosynchronous orbits are the high energy electrons, the GaAs subcell degrades faster under such type of radiation treatment. Different particles having the same energy have different damaging effect on I_{sc} and V_{oc} . Therefore, their damaging effect is converted into the equivalent of 1 MeV of energy dose. Two main methods of predicting the radiation degradation of solar cells are used : the JPL Equivalent fluence method elaborated by the US Jet Propulsion Laboratory and the NRL Displacement Damage Dose Method elaborated by the US Naval Research Laboratory. In this research work, an analytical approach of degradation predictions of multijunctions GaInP/GaAs/Ge solar cells for a small satellite has been proposed, investigated and incorporated into SPENVIS.

KEY-WORDS : Multi-junction Solar Cells - Space environment effects -Performance Analysis - Degradation Predictions.