

Interactive Presentations (IP)
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SOLAR CELLS FOR SPACE APPLICATIONS – GAMMA AND NEUTRON RADIATION
RESISTANCE TESTING FOR POLAR ORBIT CUBESATS

Abstract

To grow as humanity, we need to discover. In order to discover, we need technological growth. And so we can grow technologically, we need science. The main goal of the first part of the current study was to determine the influence of gamma radiation and high/low temperatures on the degradation of solar cells designed for space applications. Two types of solar cells were tested: 3G30A made by the German company AZUR SPACE Solar Power GmbH and SMX TASC-02x25 by SPECTROLAB, Inc. from the United States of America. The cells were exposed to gamma rays source ^{60}Co to escalated doses 0.5, 1, 2, 10 and 30 kGy. The temperature conditions in the special irradiation box during gamma irradiation were $+30\text{ }^{\circ}\text{C}$ / $-30\text{ }^{\circ}\text{C}$. The second part of the research is focused on the neutron radiation degradation of the mentioned solar cells, irradiated to escalated doses 0.1, 0.3, 1 and 12 Gy. After each irradiation, the I-V characteristics, maximum electric power, and no-load voltage were measured and evaluated. An overview of the open-circuit voltage, maximum outputs, electric current drops in given voltage range, voltage drops in given current ranges, and overall I-V characteristics are also included in this work. One of the more significant findings to emerge from this study is to determine the radiation and temperature resistance of solar cells based on the measurement of their electrical parameters. Although this study focuses on electrical properties, the findings may well have a bearing on solar cells material testing and development. The findings of this research provide the durability information of the solar cells, which is very important for space mission planning.