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ACTIVITIES (D5)

Prediction and measurement of space weather conditions and impacts on space missions (3)

Author: Dr. Arifur Khan

LaSEINE, Kyushu Institute of Technology, Japan, markhan@ele.kyutech.ac.jp

Mr. R. Scott Hughes

United States, rshughes@usc.edu

Prof. Dr. Yu Chen

Xi'an Jiaotong University, China, chenyu@mail.xjtu.edu.cn

Prof. Kazuhiro Toyoda

Japan, toyoda@ele.kyutech.ac.jp

Prof. Mengu Cho

Japan, cho@ele.kyutech.ac.jp

Mr. Andy Gray

United Kingdom, Andy.Gray@uk.qioptiq.com

ROLE OF AGING ON THE THRESHOLD OF ELECTROSTATIC DISCHARGE OF SOLAR ARRAY
COVERGLASS.

Abstract

Coverglass has been widely used over the solar cell of satellite to protect damage due to irradiation of UV, proton, electron, etc. However, charge accumulation due to high-energy proton or electron irradiation or ageing due to thermal cycling may degrade the quality and affect the threshold for electrostatic discharge (ESD). ESD occurs due to differential charging originated from the charge entrapment and transportation through the surface as well as bulk material causing the potential difference at different locations. When surface potential of any insulating material is higher than the subsurface/substrate potential, it is named as Inverted Potential Gradient (IPG), where the ESD probability is much higher than the opposite condition. In order to reveal the effect of aging on the threshold of ESD in the IPG scenario, several coverglass (CMG100-AR) samples, produced by Qioptiq, has been aged by thermal cycling (-160°C to +110°C, 348 cycles) and high-energy (500 keV) electron beam irradiation. A ground experiment has been conducted by placing virgin and exposed (aged) coverglass in vacuum, irradiated by energetic electron beam to simulate artificial ESD and measured the sample's surface potential by non-contact method before and after the discharge occurred. Statistical analysis and Weibull distribution confirms that ESD threshold of thermally aged coverglass is higher than the virgin coverglass.