

47th SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE  
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

Mr. R. Scott Hughes  
United States  
Prof.Dr. Yu Chen  
Xi'an Jiaotong University, China  
Prof. Kazuhiro Toyoda  
Japan  
Prof. Mengu Cho  
Japan  
Mr. Andy Gray  
United Kingdom

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.