

Preface

The collection of papers in this book was presented at the tenth meeting of the International Conference on Protection of Materials and Structures from Space Environment (ICPMSE-10J) held in Okinawa, Japan, in June 2011.

The year 2011 marked a remarkable achievement for ICPMSE: its tenth meeting. Since the first meeting in 1992, the conference has grown steadily, attracting a large number of engineers, scientists, researchers, and managers from industrial companies, scientific institutions, and government agencies in Canada, USA, Asia, and Europe, thus becoming a truly international event.

The most recent ICPMSE meeting, originally scheduled for 2010, was postponed to 2011. This was because Japanese scientists from JAXA and other organizations wanted to join ITL in organizing the meeting and even offered to conduct it in Japan.

It seemed for a moment that the devastation caused by the nuclear accident at Fukushima, which was triggered by an earthquake and tsunami off the Pacific coast of the Tohoku region of Japan on March 11, 2011, would put in jeopardy the ICPMSE-10J meeting. However, there were practically no withdrawals or cancellations in participation due to these tragic events. The organizing committee is very thankful to all participants who decided to attend the meeting despite the situation in the North-East region of Japan.

The year 2011 was very special to the space community worldwide, since it marked the 50th anniversary of Yuri Gagarin's spaceflight. Gagarin, popularly called "The Columbus of the Cosmos," was the first human being to journey into outer space, when his Vostok spacecraft completed an orbit of the Earth on April 12, 1961. Half a century ago, Gagarin's spaceflight kicked off the era of human space travel. Since then, humans have established a solid presence in space through manned space stations, travel to the Moon, and future plans of space colonization.

In addition to the ISS that is fully functional, with astronauts and cosmonauts servicing it and using it for scientific and commercial activities, space laboratories like China's Tiangong 1 are being planned to be launched.

The year 2011 was also remarkable in that it marked the end of the US space shuttle era, with NASA officially setting a date of June 28 for the launch of the last

space shuttle Atlantis, after which the Atlantis and NASA's two other orbiters, Discovery and Endeavour, will retire for good.

New countries with ambitious space exploration programs that include launching satellites to orbit the Moon, landing on the Moon, and building space stations are joining the world space community. Mars exploration programs are also getting wider support and are gaining momentum. A common denominator for all activities of mankind in space is the safety of astronauts and cosmonauts and the reliability of the structures that operate in conditions of space environment. The influence of the space environment on materials and structures will remain, therefore, a timely topic for years to come. Questions about thermal stability, resistance to radiation, resistance to combined effects of various space factors, etc. will continue to accumulate with the development of new materials and protective coatings.

The goals of the ICPMSE meeting are, therefore, as in the past years, to facilitate exchanges between members of the various engineering disciplines involved in the development of space materials, including aspects such as environmental hazards of LEO, GEO, and Deep Space; ground-based qualification; and in-flight experiments and lessons learned from operational vehicles. To reflect on all such developments, the program of the meeting, in addition to the traditional topics of protection of materials and structures from atomic oxygen, VUV, and particle irradiation and thermal effects includes also such topics as micrometeoroids, space weather, and relevant protection issues for travel to Moon, Mars, and other planets as well as Deep Space exploration.

As a result of a very enthusiastic response to the first call for papers, over 100 contributions covering a wide range of topics on environmental issues were submitted with over 60 of them being published in these proceedings.

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