

Preface

The collection of papers in this book was presented at the eleventh meeting of the International Conference on Protection of Materials from Space Environment—ICPMSE-11 held in Lijiang, China, in May of 2014. Since the first meeting in 1992, the ICPMSE conference has grown steadily, attracting a large number of engineers, scientists, researchers, and managers from industrial companies, scientific institutions, and government agencies in Canada, the USA, Asia, and Europe, thus becoming a true international event.

After the 10th ICPMSE meeting that has been held in Japan in 2011, the ICPMSE organizers were approached by Chinese scientists with an offer and an invitation to conduct the next meeting in China. After a series of consultations with the members of the organizing and program committees of the ICPMSE and discussions and meeting with our Chinese colleagues, a final decision was made to conduct the 11th ICPMSE meeting in China. The beautiful city of Lijiang was chosen as the venue for the meeting.

The 11th International Space Conference on “Protection of Materials from Space Environment” ICPMSE-11 organized by ITL Inc. (Integrity Testing Laboratory) and the Beijing Institute for Spacecraft Environment Engineering (BISEE) was held from 19 to 23 May 2014 in Lijiang, China. The Conference was sponsored by the Chinese Academy of Space Technologies (CAST) and a number of organizations. The goals of the meeting, as in previous years, were 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.

From being a duel-type space race between USSR and USA through the 1950s–1980s, with Europe joining it in the 1990s, the space exploration activities exploded in the 1990s with many countries like Japan, India, China, and others becoming major players in exploration of the space and the planets and comets.

In addition to the International Space Station that is fully functional by now with astronauts and cosmonauts servicing it and using for scientific and commercial

activities, other space laboratories like China's Tiangong 1, 2, and 3 were either launched already (Tiangong 1) or are being planned for launching in the next few years (Tiangong 2 and 3).

A number of ambitious space exploration programs were proposed that will see launching satellites to Moon orbits, landing on the Moon, and building Space Stations. The Mars exploration programs are also getting wider support and are gaining momentum. A common denominator to all activities of mankind in space is the safety of astronauts and cosmonauts and the reliability of the structures that are operating in conditions of space environment.

The influence of 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.

As in past years, in addition to the traditional ICPMSE topics of protection of materials and structures from the atomic oxygen, VUV, and particle irradiation and thermal effects, topics covering micrometeoroids, space weather, and relevant protection issues for travel to Moon, Mars, other planets, and Deep Space exploration were added.

The 11th ICPMSE meeting, with a large majority of the over 150 papers being submitted by scientists from various Chinese space organizations, allowed offering to the Western scientists and engineers, working in the field of space environmental effects, a very rare glimpse into the work of numerous organizations in China in this area. Keeping in mind the increasing role that China is playing in the exploration of the space, we decided to use this unique opportunity and to publish most of the submitted papers in the proceedings. The delay in a timely publication of the proceedings was mainly due to the linguistic problems with editing of the proceedings.

ICPMSE-11 meeting covered a range of interdisciplinary topics concerning the protection of materials and structures in space. Its main objective is to continue the discussion on the effects of the aggressive Low Earth Orbit (LEO) as well as the GEO and Deep Space environments on materials and structures and to discuss ways predicting and reducing these for short- and long-term space missions. Over 150 contributions covering a wide range of topics on environmental issues were submitted with over 60 of them being published in these proceedings.

New generations of scientists in the last six decades were methodically studying the space environment and its effects on the materials. The coming generations of scientists will have to continue this work and tackle new challenges, continuing to build the wall of confidence allowing humans to continue the colonization of space. And we hope that ICPMSE-11 will be a small stone in that wall.

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