

Introduction: Space Environmental Effects on Materials III

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We are pleased to bring you this special edition of the Journal of Spacecraft and Rockets, titled Space Environmental Effects on Materials III. The papers presented in this edition were selected from the 11th International Symposium on Materials in Space Environment (ISMSE), which was held in Aix-en-Provence in the South of France in September 2009. ISMSE-11 was organized by the Centre National d'Etudes Spatiales (CNES) in collaboration with ONERA and ESA.

Whether space missions are dedicated to Earth observation, astronomy, space exploration, or future human settlement on planets, they are all subjected to a very harsh environment. The natural, and sometimes self-induced, environment of a space system consists of high vacuum, extreme temperatures and thermal cycling, charged particles fluxes, atomic gas species, volatile materials as contaminants, electromagnetic radiations, debris, and micrometeoroids which can separately, or in combination, degrade a mission or lead its loss. In addition to Earth's climate, the space weather around Earth and other planets and its effects on structures and materials are extremely important for a large community of researchers, scientists, and engineers.

Experience acquired during more than 50 years in space vehicles development and use has clearly demonstrated the vast importance of using adequate materials as well as the need to consider and to anticipate their degradation in orbit. Space environment and its synergetic effects are still of major concern and need to be characterized, understood, simulated and anticipated so that they can be integrated in the design of spacecraft or space instruments to ensure that they are reliable and also safe for manned flights.

The aim of ISMSE is to allow an exchange of experiences and information among scientists and engineers involved in many disciplines related to materials in the Space environment. This was achieved at ISMSE-11 for the 140 attendees representing 60 different organizations and 16 different countries. The main topics focused at ISMSE and presented in this special edition are charging effects, contamination, protection from atomic oxygen and debris, and lessons learned from flight experiments.

One full day of ISMSE was also dedicated to new technologies and materials, showing strong interest, potential, and concerns of a quite active community to get adequate or innovative materials and coatings. This was the opportunity to see some highly efficient products such as black coatings; atomic oxygen protective coatings; smart radiation devices; low outgassing silicone resins; characterization of thermoplastics', Kevlar's, and nanoparticles' capabilities; and the evaluation of predictive models.

We hope this special edition of the Journal of Spacecraft and Rockets including 16 selected papers (the second half of which are printed in this issue) among more than 100 presented at ISMSE-11 will give you the opportunity to increase your knowledge in the field of space environment characterization, modeling of degradation processes as well as lessons learnt from ground and in-flight testing.

As president of the 11th ISMSE, I personally wish to take this opportunity to thank again my colleagues of the program committee for helping in the selection of the papers and planning of the sessions, to thank the organizing committee, ONERA and ESA, as well as all the participants (authors and exhibitors) who helped to make this meeting an efficient forum for exchanges.

Looking forward toward next conferences dealing with same topics, I wish same success to the International Conference Protection of Materials and Structures in a Space Environment (ICPMSE-10J), co-organized by Integrity Testing Laboratory (Canada) and the Japan Aerospace Exploration Agency in June 2011 in Okinawa (Japan), and to ISMSE-12, foreseen in 2012 at the European Space Agency in Noordwijk (The Netherlands).

Finally, I would also like to greatly thank Dave Edwards for his work as Editor of this special issue.

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