

ISMSE - ICPMSE 2024 - FINAL PROGRAM

Monday, October 7, 2024

- 09:00 - 09:30 Conference doors open and registration - Registration/Welcome desk open Monday -Thursday
- 09:30 - 10 :30 **Opening Session #1 (auditorium)**
Welcome & introduction of the conference by ISMSE & ICPMSE programme committee chairs:
Sophie Duzellier (ONERA) and Jacob Kleiman (ITL Ltd.)
Overview of Programme, Panels & Proceeding
Invited talks : focus on Materials in Space
□ **Environmental survivability of materials, overview of European technology developments and future vision (A. Tighe, ESA)**
□ **Summary of U.S. National Science Foundation Space Materials workshop (Prof. T. Minton, Univ. Colorado)**
- 10:30 - 11:00 Coffee break (Exhibition hall)
- 11:00 12h30 **Opening Session #2 (auditorium)**
Session Chairs : Sophie Duzellier (ONERA) & Jacob Kleiman (ITL Ltd)
Keynotes
□ **Space Safety and Sustainability-Concept of space debris protection (K. Nitta, JAXA)**
□ **EuCLID water ice contamination (L. Venancio, ESA)**
Industries & companies pitches
(ITL Ltd, LUMETIS, NIHON DEMPYA KOGYO Co., NIPPON STEEL Chemical & Material Co., TRAD)
- 12:30 - 14:00 Lunch (Exhibition hall)
- 14:00 - 16:00 **Innovative & Sustainable Materials #1 (auditorium) co-chaired by E. Grossman (Noga 3D Inn.) & K. Jokela (Isaware)**
› **Development of Advanced Materials for Space Deployables**
Edwin Teo, Nanyang Technological University 14:00-14:30 (30min)
› **Innovative and sustainable materials for space application**
Ugo Lafont, ESA-ESTEC, TEC-QEE, Keplerlaan 1, 2200 AZ Noordwijk, The Netherlands 14:30-14:50 (20min)
› **Use of biobased materials in Space : not only sustainable but a real competitive advantage**
Christian Puig, Airbus [France] 14:50-15:10 (20min)
› **Material recycling and hardware re-use for Moon and Martian settlement**
Francesco Caltavuturo, Orbitale Hochtechnologie Bremen 15:10-15:30 (20min)
› **Polymer Coatings as a Pathway to atomic level cleanliness, bioburden reduction and surface sampling of DNA**
James Hamilton, University of Wisconsin-Platteville 15:30-15:50 (20min)
- 16:00 - 16:30 Coffee break (Exhibition hall)
- 16:30 - 18:10 **Environment Effects on Materials #1 (auditorium)) co-chaired by J. Eck (ESA) & K. de Groh (NASA GRC)**
› **Solar Wind Proton Flux on Space Exposed Materials in the Interplanetary Environment**
Joseph Minow, NASA Marshall Space Flight Center 16:30-16:50 (20min)
› **Dose level at the surface of materials in space environment**
Christophe Inguibert, ONERA Toulouse 16:50-17:10 (20min)
› **Estimation of End-of-Life Solar Absorptivity for Complex, Multi-Phased Space Missions - Brandon Hoffmann,**
Jacobs Technology ESCG - Abigail Zinecker Howard, NASA Johnson Space Center 17:10-17:30 (20min)
› **Synergistic Effects of Dual Source Irradiation with Protons and Electrons**
Erik Klein, Institute of Space Systems, Mechanics & Thermal Systems 17:30-17:50 (20min)
› **Impact of Single and Combined Space Environment Factors on the Performance of Elastomer Micropatterned Dry Adhesives - Lennart Ziemer, Technical University of Berlin / Technische Universität Berlin 17:50-18:10 (20min)**
- 18:30 - 20:30 Welcome Cocktail - Offered by ITL in Exhibition Hall

Tuesday, October 8, 2024

- 08:30 - 09:10 **Keynote (auditorium) – R. Lee (Booz Allen Hamilton) Title: Advancements in Lunar Dust Mitigation**
- 09:10 - 10:30 **Planetary Environment & Lunar Dust Mitigation #1 (auditorium) co-chaired by J. Kleiman (ITL inc.) & S. Gendron (CSA)**
› **Characterization of thermo-optical properties of Power and Thermal Functional Surfaces Exposed to Lunar Dust mulants - Sophie Duzellier, DPHY-ONERA Univ. de Toulouse 09:30-09:50 (20min)**
An investigation of lunar dust simulant adhesion using a centrifuge system under high vacuum and UV irradiation nditions - Alice Suarez Kahan, DPHY-ONERA Univ. de Toulouse 10:10-10:30 (20min)
› **The Dusty Environment Application and Research DEAR project**
- Harald Steininger, OHB System AG 09:50-10:10 (20min)
› **Overview of NASA Gateway Lunar Dust Mitigation and Contamination Modeling and Analysis**
- Ronald Lee, Booz Allen Hamilton 09:10-09:30 (20min)

- 10:30 - 11:00 Coffee break (Exhibition hall)
- 11:00 - 12:30 **Atomic Oxygen & LEO/VLEO Missions #1 (auditorium) co-chaired by T. Minton (univ. Colorado) & M. Tagawa (Kobe Univ.)**
- › Space-durable, 3D printed, high-performance polymers based on cyanate ester/extended-bismaleimide - Eitan Grossman, NOGA 3D Innovations, Soreq NRC 11:00-11:20 (20min)
 - › Effects of Atomic Oxygen on White Kapton and Flexible Flat Cables for the Interconnections in Solar Arrays - Miguel Ramiro, DHV Technology 11:20-11:40 (20min)
 - › Evaluation of the Atomic Oxygen Effect in case of Complex Geometry: Optimization of Simulation and Prediction for the EMA-SESAME Experiment - David L  v  que, DPHY-ONERA Univ. de Toulouse 11:40-12:00 (20min)
 - › Evaluation of the Atomic-Oxygen Resistance of Hybrid Organic/Inorganic Polymers from Lab and LEO Exposures - Aki Goto, Japan Aerospace Exploration Agency [Tsukuba], University of Colorado [Boulder] 12:00-12:20 (20min)
- 12:30 - 14:00 Lunch (Exhibition hall)
- 14:00 - 16:00 **Contamination #1 (auditorium) co-chaired by G. Rioland (CNES) & M. Grabe (DLR)**
- › Overview of the Lunar Gateway External Contamination Environment
Crystal Quiroz, Oceaneering, JETS Contract, Houston, TX, USA 14:00-14:20 (20min)
 - › Outgassing laws unraveled by characterizing variable thickness materials at species-level
Jean-Fran  ois Roussel, DPHY-ONERA Univ. de Toulouse 14:20-14:40 (20min)
 - › Development of Lunar Gateway External Molecular Outgassing Contamination Models
William A. Hoey, Jet Propulsion Laboratory, California Institute of Technology 14:40-15:00 (20min)
 - › Influence of outgassing and desorption on pressure in spacecraft cavities in flight
Jean-Fran  ois Roussel, DPHY-ONERA Univ. de Toulouse 15:20-15:40 (20min)
- 16:00 - 16:30 Coffee break (Exhibition hall)
- 16:30 - 18:00 **Flight Experiment & Data (auditorium) co-chaired by Y. Kimoto (Jaxa) & D. Mueller (ETH Zurich)**
- › THERME experiments: a matter of contamination deposit morphology - David Lansade, DPHY-ONERA Univ. de Toulouse 16:30-16:50 (20min)
 - › Overview of Results from the MISSE 9-15 Polymers and Composites Experiment 1-4 (PCE 1-4) - Kim de Groh, NASA Glenn Research Center 16:50-17:10 (20min)
 - › New Materials for LEO, GEO and Planetary Environments: Preliminary Results from MISSE-17 Experiment - Jacob Kleiman, Integrity Testing Laboratory Inc 17:10-17:30 (20min)
 - › Presentation of EMA : assembly, integration and testing - Isabelle Savin Delarclause, Centre National d'  tudes Spatiales [Toulouse] 17:30-17:50 (20min)

Wednesday, October 9, 2024

- 08:30 - 09:10 **Keynote (auditorium) – “Characterization of Organic Footprint from Moon, Mars and Ocean Worlds Landing Systems for Robotic and Crewed Missions”, C. Soares (NASA JPL)**
- 09:10 - 10:30 **Contamination #2 (auditorium) co-chaired by JF. Roussel (ONERA) & O. Ergincan (ESA)**
- › Analysis of Particle Contamination Generated by Ion Thruster Sputtering on Thermal Control Paint - Shun Imai, Japan Aerospace Exploration Agency [Sagamihara] 09:10-09:30 (20min)
 - › Polymers sputtering and induced contamination due to plasma thrusters - Marc Villemant, DPHY-ONERA Univ. de Toulouse - 09:30-09:50 (20min)
 - › Ground-based experimental study on the contamination potential of a freely expanding 10 N bi-propellant thruster plume - Leonie Buntrock, German Aerospace Center 09:50-10:10 (20min)
 - › The EPIC-2 Bipropellant Plume-Induced Contamination Test Program and Application to Europa Clipper, Lunar Gateway and the International Space Station Programs - Carlos Soares, Jet Propulsion Laboratory 10:10-10:30 (20min)
- 10:30 - 11:00 Coffee break (Exhibition hall)
- 11:00 - 12:00 **Standards and Regulation (auditorium) co-chaired by E. Laurent (CNES) & M. Holynska (ESA)**
- › Development of the long-term storage guidelines for materials and processes: a European collaboration to draw-up harmonized recommendations and good practices. – Malgorzata Holynska, ESA-ESTEC, TEC-QEE, Keplerlaan 1, 2200 AZ Noordwijk, The Netherlands 11:00-11:20 (20min)
 - › Regulatory challenges for the European space sector - Adrian Tighe, Sarah Rodriguez-Castillo, ESA - ESTEC (Netherlands) 11:20-11:40 (20min)
 - › Solvents and calibration standards alternatives with reduced environmental impact for space activities - Delphine Faye, Centre National d'  tudes Spatiales [Toulouse] 11:40-12:00 (20min)

12:00 - 12:30 **Presentation of posters and round tables (auditorium)**

12:30 - 14:00 **Lunch (Exhibition hall)**

14:00 - 17:00 **Posters Session (Exhibition hall)**

15:30 - 17:00 **Round Tables (auditorium and side rooms):**

- Space materials outgassing: long term prediction, which physics (diffusion?), species separation, experimental characterization / modeling (ONERA, JF Roussel)**
- Working towards a consolidated approach for combined environmental testing – development of handbook, guidelines. How and when to test? technical / cost trade-off, what type of testing should be performed etc (ESA, J. Eck)**
- Biobased or recycled materials for space? (ADS, C. Puig)**

19:00 - 23:55 **Conference Dinner – at ESTEREL Arena**

Thursday, October 10, 2024

09:00 - 10:30 **Planetary Environment & Lunar Dust Mitigation #2 (auditorium) co-chaired by A. Saverino (TAS) & C. Steagall (NASA JSC)**

- › **Interaction of Lunar Dust Simulants with Materials: Importance of Charging**
Jacob Kleiman, Integrity Testing Laboratory Inc 09:00-09:20 (20min)
- › **Ground testing of lunar dust simulant electrostatic charging under irradiation**
Jean-Charles Matéo-velez, DPHY ONERA, Université de Toulouse 09:20-09:40 (20min)
- › **Lunar dust Contamination on habitable modules for exploration : impacts and mitigation approach for I-Hab**
Ilaria Locantore, Thales Alenia Space 09:40-10:00 (20min)
- › **Design, Synthesis and Characterization of Novel Space Materials for Lunar Passive Dust Mitigation**
Guido Saccone, Italian Aerospace Research Centre 10:00-10:20 (20min)

10:30 - 11:00 **Coffee break (Exhibition hall)**

11:00 - 12:30 **Atomic Oxygen & LEO/VLEO Missions #2 (auditorium) co-chaired by A. Goto (Jaxa) & S. Remaury (CNES)**

- › **Individual erosion yields of FEP by atomic oxygen and by argon in simulated VLEO environments**
Masahito Tagawa, Kobe University 11:00-11:20 (20min)
- › **Evaluation of atomic oxygen effects obtained onboard SLATS/MDM**
Yugo Kimoto, Japan Aerospace Exploration Agency [Tsukuba] 11:20-11:40 (20min)
- › **Molecular Beam Investigations of Atomic Oxygen Reactivity and Scattering on Material Surfaces for Satellites in Very Low Earth Orbit**
Timothy Minton, University of Colorado Boulder 11:40-12:00 (20min)
- › **Drag and O-atom Exposure Modeling for Satellites in Very Low Earth Orbit**
Tom Schwarzentruher, Department of Aerospace Engineering and Mechanics, University of Minnesota 12:00-12:20 (20min)

12:30 - 14:00 **Lunch (Exhibition hall)**

14:00 - 16:00 **Contamination #3 (auditorium) co-chaired by D. Faye (CNES) & C. Soares (NASA JPL)**

- › **Laser-Induced Contamination: Analyzing deposits from epoxy outgassing under 355 nm irradiation.**
Amer Aoun, Institut Fresnel, Centre National d'Études Spatiales 14:00-14:20 (20min)
- › **Use of Multimodal camera for quick contamination assessments**
Guillaume Thin, LUMETIS 14:20-14:40 (20min)
- › **Simulation Approach and Examples of Particulate Contamination Transport Inside Fairing using DUSTFLOW**
Armen Jaworski, CIM-mes Projekt 14:40-15:00 (20min)
- › **The Effect of Impingement Angle on Bipropellant Thruster Plume Degradation of Spacecraft Materials**
Courtney Steagall, NASA, Johnson Space Center, Houston, TX, USA, 15:00-15:20 (20min)
- › **Micro-ElectroMechanical Systems (MEMS) Fabry-Perot (FP) spectrometer for measurement of contamination deposition**
Gregory Bouquet, Smart Sensor Systems and Microsystems, SINTEF, Oslo, Norway 15:20-15:40 (20min)

16:00 - 16:30 **Coffee break (Exhibition hall)**

16:30 - 18:00 **Innovative & Sustainable Materials #2 (auditorium) co-chaired by C. Puig (ADS) & D. Kim (Silla Univ.)**

- › **Research on New Siloxane-Block-Polyimide Film for Space Application** - *Yugo Kimoto, Japan Aerospace Exploration Agency [Tsukuba] 16:30-16:50 (20min)*
- › **Self-healing Composite for MMOD Impact Damage Recovery** - *Wojciech Guziewicz, AGH University of Krakow, Space Technology Centre 16:50-17:10 (20min)*
- › **Development and qualification of a Glass Fabric for use in harsh space exploration environments** - *Christoph Roupec, Beyond Gravity Austria GmbH 17:10-17:30 (20min)*

› **Development of Cryogenic Phase Change Materials for Lunar Sample Return** - Erin Hayward, NASA Marshall Space Flight Center 17:30-17:50 (20min)

Friday, October 11, 2024

- 08:40 - 10:30 **Environment Effects on Materials #2 (auditorium) co-chaired by S. Lewandowski (ONERA) & J. Minow (NASA MFSC)**
- › **Modification of Chemical Contaminants Exposed to UV-Radiation: A Methodological Approach Applied to Epoxy Adhesives**
Xavier Coqueret, CNRS UMR 7312 - Delphine FAYE, Centre National d'Études Spatiales 08:40-09:00 (20min)
 - › **Optical signature simulation of proton-irradiated space white paint coating**
Agnès Lecadre-Scotto, ONERA / DPHY, Université de Toulouse [Toulouse] 09:00-09:20 (20min)
 - › **First Evaluation under Ultraviolet Radiations and Thermal Cycles of Nanoparticle-based Protective Coatings for Heterojunction Silicon Cells**
Philippe Voarino, Univ. Grenoble Alpes, CEA, Liten, Campus Ines 09:20-09:40 (20min)
 - › **Physical properties evolution of PEEK under proton irradiation**
Lise Sujol, ONERA, CIRIMAT 09:40-10:00 (20min)
 - › **Update on Planetary, Lunar, & Asteroid Natural Environment Testbed (PLANET)**
Erin Hayward, NASA Marshall Space Flight Center 10:00-10:20 (20min)
- 10:30 - 11:00 Coffee break
- 11:00 - 12:00 **Planetary Environment & Lunar Dust Mitigation #3 (auditorium) co-chaired by JC. Mateo-Velez (ONERA) & A. Tighe (ESA)**
- › **A combined Eulerian-Lagrangian approach to simulation of plume-regolith interaction during the descent and ascent phase of the lunar lander** - Armen Jaworski, CIM-mes Projekt 11:00-11:20 (20min)
 - › **Instrumental methods to monitor and counter planetary oxidants in space applications** - Christos D. Georgiou, University of Patras, Greece - Elias Chatzitheodoridis, National Technical University of Athens, Greece, ESA - ESTEC (Netherlands) - Ioannis Markopoulos, OI Mechatronics, Greece - Malgorzata Holynska, ESA - ESTEC (Netherlands) - Adrian Philip Tighe, ESA - ESTEC (Netherlands) 11:20-11:40 (20min)
 - › **The significance of producing activated Lunar and Martian dust simulants of high-fidelity for planetary exploration and habitability purposes** - Elias Chatzitheodoridis, National Technical University of Athens, Greece, ESA - ESTEC (Netherlands) - Christos D. Georgiou, University of Patras, Greece - Ioannis Markopoulos, OI Mechatronics, Greece - Malgorzata Holynska, ESA - ESTEC (Netherlands) - Adrian Philip Tighe, ESA - ESTEC (Netherlands) 11:40-12:00 (20min)
- 12:00 - 12:30 **Closing Session (auditorium)**