Agenda

• 12:00 – 12:10 PM  Welcome and Introduction to BIG Idea Challenge

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   Tufted Electrostatic Solution To Regolith Adhesion Dilemma (TEST-RAD)

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• 12:40 – 12:55 PM  Colorado School of Mines with ICON, Masten Space Systems, Adherent Technologies Inc.,
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   Leidenfrost Dusting as a Novel Tool for Lunar dust Mitigation

• 1:55 – 2:00 PM  Wrap Up
Congratulations!

NASA Astronaut Candidate
Andre Douglas
LSIC Dust Mitigation Confluence Site

• Please contact Andrea Harman (ams573@alumni.psu.edu) to get set up with an account!

• Dust Mitigation Discussion page and wiki

https://lsic-wiki.jhuapl.edu/display/DM/Dust+Mitigation+Home
Join the Discussion on Confluence Site

• Please contact Andrea Harman (ams573@alumni.psu.edu) to get set up with an account!

• Dust Mitigation Discussion page and wiki

• 1. Sign-in to add a comment

• 2. Add comment at bottom of page

• 3. You can comment before, during, or after today’s meeting

https://lsic-wiki.jhuapl.edu/x/_4qXAQ
Updates and Communications

• Monthly LSIC newsletter – New edition came out early December
  - [http://lsic.jhuapl.edu/Resources/](http://lsic.jhuapl.edu/Resources/)

• Mailing list
  - The listserv goes to all participants. Use with caution. But feel free to use!
  - Please make sure to add LSIC_DUSTMITIGATION@LISTSERV.JHUAPL.EDU to safe senders list.
  - If we need smaller, focused lists we can set those up

• Updates to the webpage - [http://lsic.jhuapl.edu/Focus-Areas/Dust-Mitigation.php](http://lsic.jhuapl.edu/Focus-Areas/Dust-Mitigation.php)
  - Notes, slides, recordings from telecons posted here

• Wiki is ready!
  - Confluence is free to you and available to all registered LSIC members
  - To request an account, please email Andrea Harman: ams573@alumni.psu.edu

• Lightning Talks at monthly focus group meetings
  - Anyone can volunteer to give a featured talk (~15 mins)
  - Email me if you want to sign up: Facilitator_DustMitigation@jhuapl.edu

Follow the Code of Conduct for all Focus Group communications
Lunar Surface Innovation Consortium
Dust Mitigation Focus Group Brief

2021 BIG Idea Challenge on Dust Mitigation
Michael Johansen | 12.16.2021
Through this challenge, NASA seeks innovative ideas from the academic community for a wide range of lunar dust mitigation solutions for issues including reducing dust clouds upon landing, dust removal from spacesuits and other surfaces, dust obstruction of optical systems, and reducing in-cabin particulate levels, among others. Specifically, teams are invited to propose innovative solutions with supporting original engineering and analysis in response to one of the following areas:

- **Landing Dust Prevention and Mitigation** - to preclude or protect from plume/surface interactions which may result in damaged landers and nearby surface assets.

- **Spacesuit Dust Tolerance and Mitigation** - to limit dust adherence to spacesuits and other deleterious effects to its subsystems.

- **Exterior Dust Prevention, Tolerance, and Mitigation** - to protect lunar surface systems or preclude dust from entering habitats and landers

- **Cabin Dust Tolerance and Mitigation** - to clean habitable volumes and their interior surfaces, which helps prevent dust from making it back to Gateway and Orion when the lander returns to lunar orbit from the surface

**Note:** This solicitation is not seeking the development of new monitoring technologies. However, existing monitoring technologies and strategies may be required for verification.
Design Constraints and Considerations

Design Constraints

- Able to manage and mitigate abrasive dust and small particles (~0.5-50 μm)
- Low mass, small size, low power, etc.
- Cost-effective solutions
- Nonflammable
- Able to work in harsh lunar South Pole environments it is intended for
- Technologies should reach a minimum Technology Readiness Level (TRL) of 4**
  - Thermal and/or vacuum testing, and use of appropriate dust simulants are required but may be substituted for substantial analysis if facilities unavailable

Design Considerations

- The solution should be targeted for use on the Moon by 2026
- Operational use and simplicity (minimize required crew time for use and maintenance)
- Verification of dust mitigation capability
- Deployment on a NASA/commercial lunar surface system
- Deployment method (autonomous or crew assisted)
- Data rate requirements for data downlink (if necessary)
- Effective packaging for launch and Moon landing
- Credible fabrication and material selection
Brown University with Rhode Island School of Design – Most Creative Concept
“TEST-RAD: Tufted Electrostatic Solution To Regolith Adhesion Dilemma”

California Institute of Technology – Best Product Development
“Habitat Orientable and Modular Electrodynamic Shield”

Colorado School of Mines – Best Collaborations & Best Systems Engineering
“Lunar In-Situ Landing/Launch Environment (LILL-E) Pad”

Georgia Institute of Technology – Best Human Factors Design
“Hybrid Dust Mitigation Brush Utilizing EDS and UV Technologies”

Missouri University of Science & Technology – Best Subsystem Design (Electronics)
“Contaminant Ultrasonic Removal via Vibration Ejection from Solar Cells”

University of Central Florida – Best Technical Poster
“LETO - Lunar Dust Mitigating Electrostatic micro-Textured Overlay”

Washington State University – Best Technical Paper & The Artemis Award
“Leidenfrost Dusting as a Novel Tool for Lunar Dust Mitigation”

2021 BIG Idea Feature Article
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