



Thin-film solar arrays for spacecraft power generation

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[MOTIVATION]



Small spacecraft are *power starved*











Surface area, mass, and volume are *limited resources*.



Capability is choked...









Grow spacecraft...or shrink subsystem...



[OUR THIN-FILM SOLUTION]









Coupled with thin-film solar cell work throughout the community...

National Aeronautics and Space Administration













[THE LISA-T SYSTEM]



The Lightweight Integrated Solar Array and anTenna (LISA-T)

MET THE PLACE





Marshall Space Flight Center



The Lightweight Integrated Solar Array and Transceiver

SEE VIDEO IN THE NASA MSFC LOOP

TRL6 4-petal Omnidirectional ambient deployment 10/06/2016

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Omni – GN&C simplicity and non-pointed



Planar – pointed, high performance

Core components can also be configured as high power planar





Marshall Space Flight Center







SEE VIDEO IN THE NASA MSFC LOOP

TRL6 4-petal planar ambient deployment 11/10/2016











[ENVIRONMENTAL TESTING AND SURVIVABILITY]



Humidity Exposure





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Atomic Oxygen Exposure





ministration

Particulate Eadiation Exposure





Near UV Exposure







Rapid Thermal Cycling







Extended Operation at Temperature



Hot/Cold thermal vacuum deployments





Hot/Cold thermal vacuum deployments



Stowed

Mast release

Mast deployed closed

Petal unfurled



Sequential testing for 'combined' environments







Alpha Space Test & Research Alliance

MISSE10 2018-2019



LISA-T sample real estate

MISSE10 Integration November 2018

National Aeronautics and Space Administration



National Aeronautics and Space Administration

High-Efficiency Low-Mass Solar Cell Systems MISSE10 | 2018

NASA

MISSE10 Launch and Install November 2018





LISA-T can operate/survive in LEO and is moving forward...





[TRL 7 FLIGHT DEMONSTARTION: LEAPEM]



Tech demonstration to facilitate infusion?







Target Duration:

- 1 Months minimal
- 4 Months nominal6+ Months desired







National Aeronautics and

Space Administration

Large scale production for swarms or large single asset?



Print-Assisted Photovoltaic Assembly (PAPA) NASA | 2018

VIDEO Available on Reques

National Aeronautics and Space Administration

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NASA







NASA







[POWER SAIL]

BOL | 28°C | 30% IMM

 $0.6m^2$ (herein)

2.9m² (office desk)

86m² (NeaScout)

860m² (3.3 tennis courts)

- -- 200W 1AU | 86W Mars
- -- 1kW 1AU | 431W Mars
- -- 23kW 1AU | 250W Saturn

-- 300kW 1AU | 192W Pluto







PowerSail to RTG power (W) Comparison

