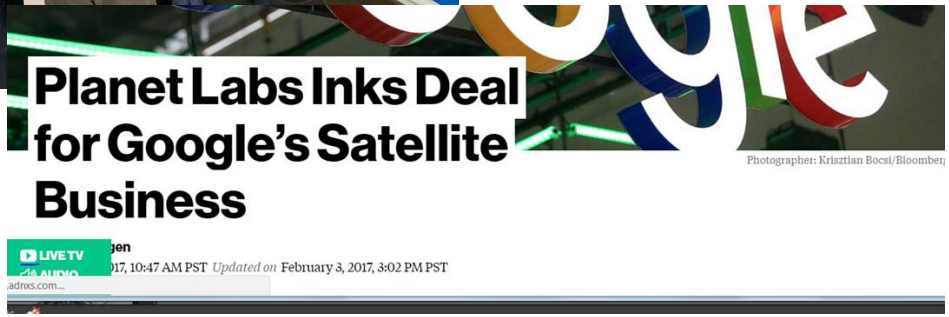
Lightweight Gallium Arsenide Solar Cells for CubeSats

Ian C. Murray

Alta Devices

Disruption in Communications/Signal Processing

Disruption in Imaging



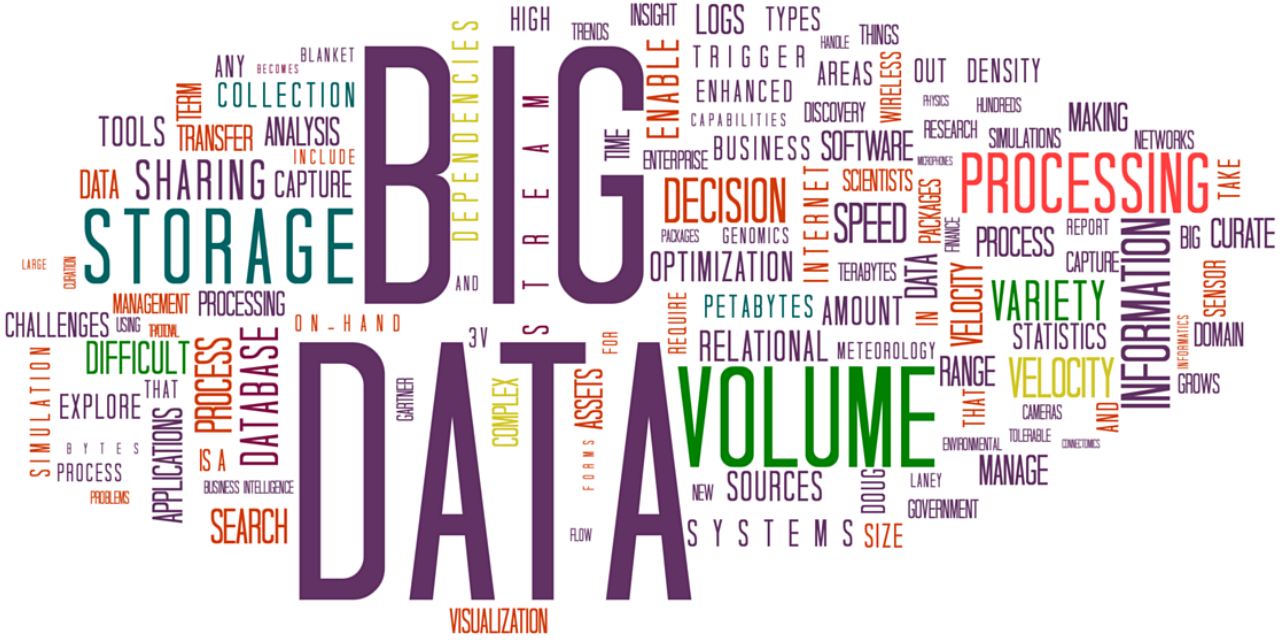
Planet Labs Inks Deal for Google's Satellite Business

Photographer: Krisztian Bocsi/Bloomberg

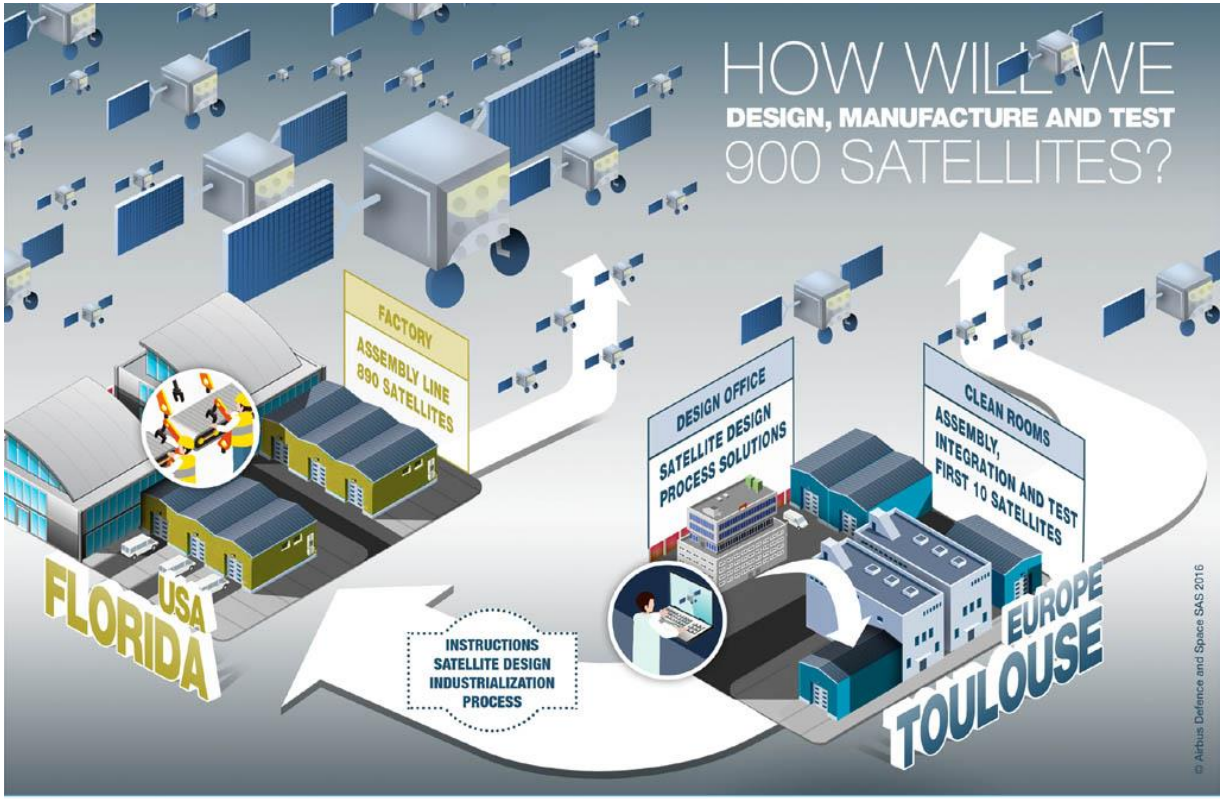
LIVE TV AUDIO

017, 10:47 AM PST *Updated on* February 3, 2017, 3:02 PM PST

Disruption in Data

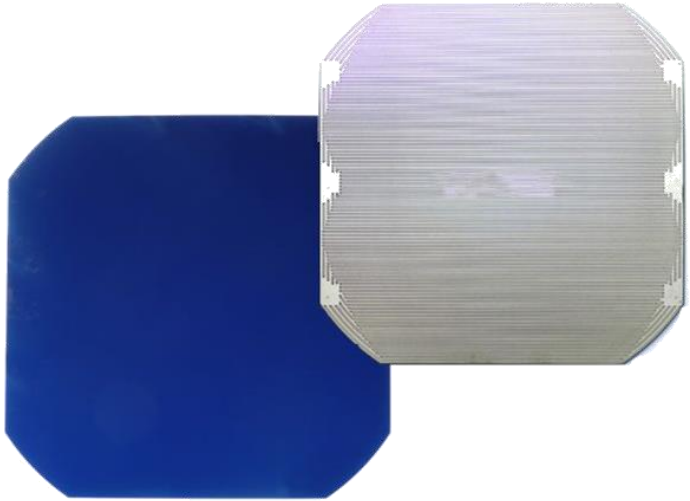


Disruption in Satellite Manufacturing

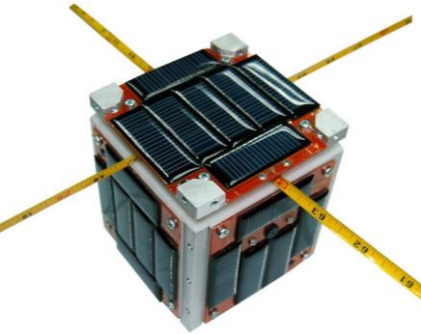


Solar Cells are a Bottleneck

- Not much change in space solar cell technology
- Still expensive, brittle, hard to work with
- Can be the most expensive hardware component!
- COTS solar cells are made from silicon – not radiation resistant

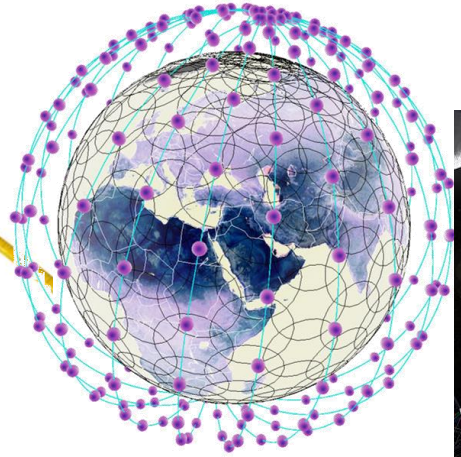


Need for Lower Cost, High Efficiency Space Solar



Cubesats
10-100W

X1000s of satellites



Constellations
1,000W

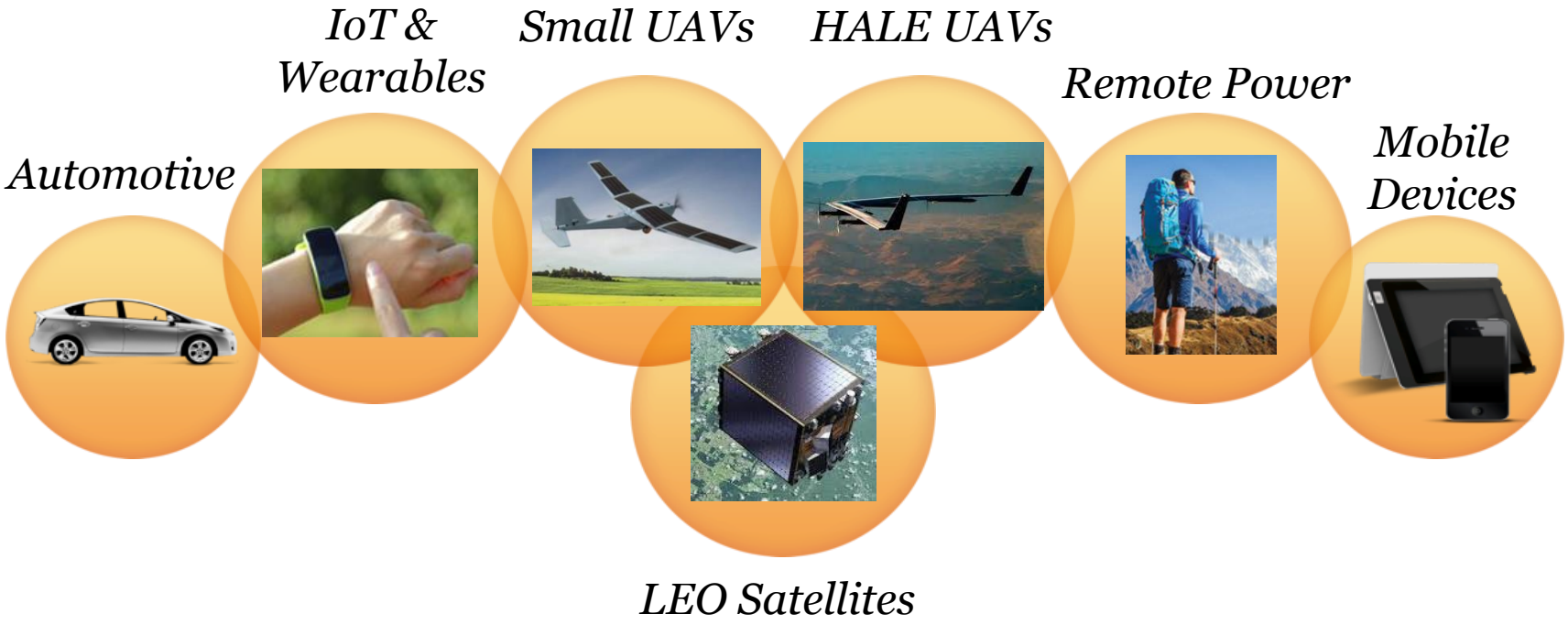
x1000s of satellites in next 5-10 years

Electric Propulsion
100,000 W

x100s in 10-20 years

Moon/Mars Bases
1,000,000 W
x10s in 50 years?

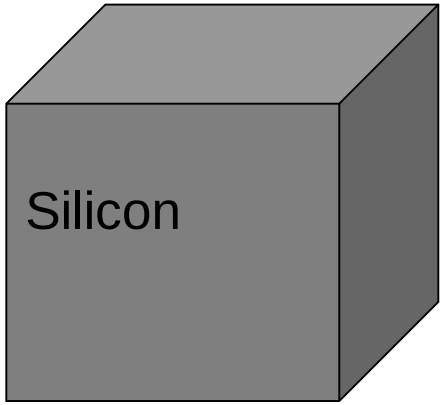
About Alta Devices

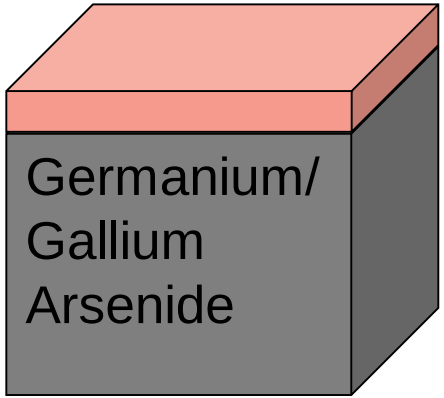


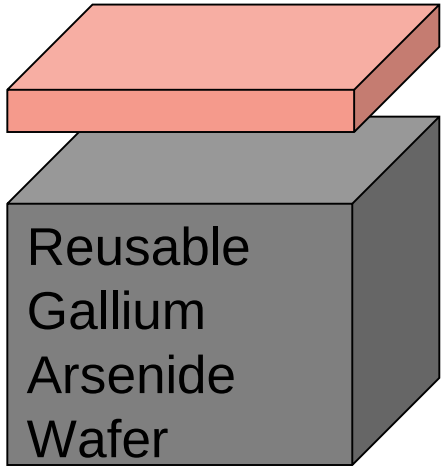
Bring high-efficiency solar to things that move, through

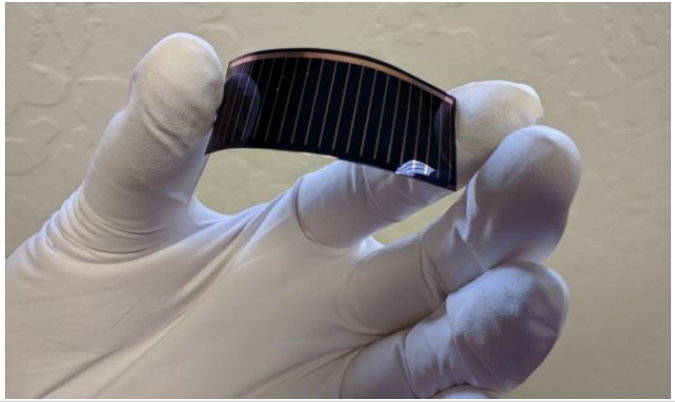
Single crystal GaAs • Epitaxial Lift Off • Advanced Cell Design

Wafer Reuse


Silicon

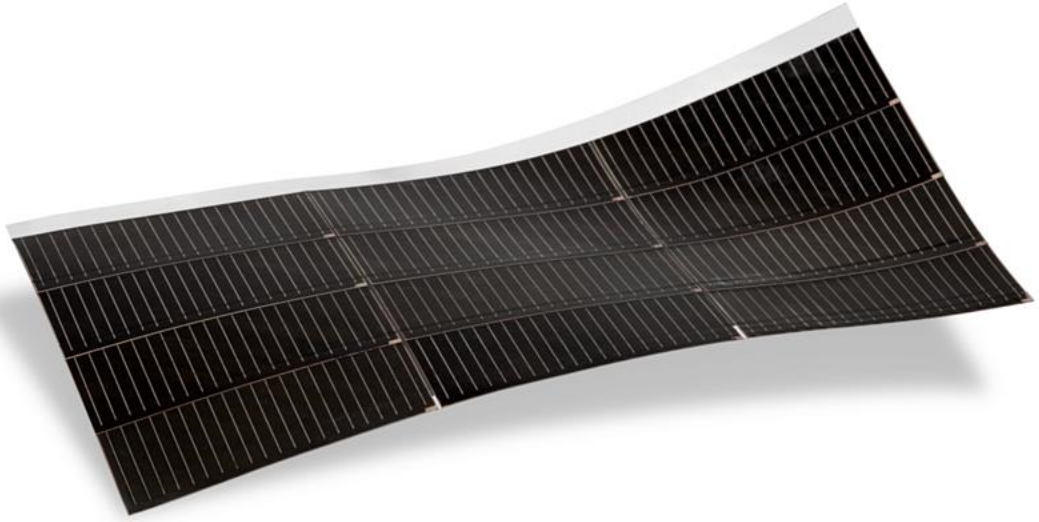

Germanium/
Gallium
Arsenide


Reusable
Gallium
Arsenide
Wafer



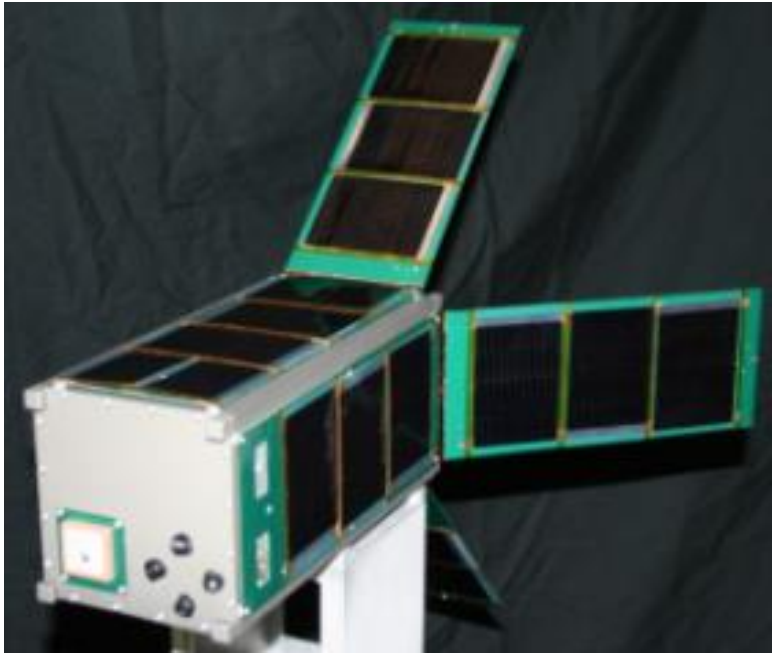
What Alta Brings to Space

- Good efficiency (20-25% AM0)
- Radiation resistance
- Light weight
- Easy to handle
- Various form factors
- Manufacturing scale
- Low Cost



NearSpace Launch Fastbus

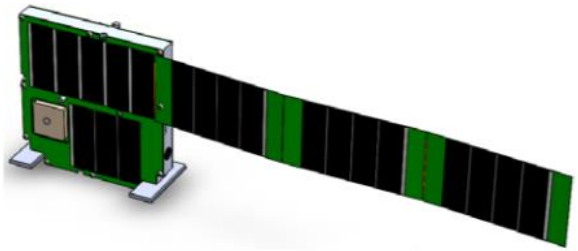
- Created by Near Space Launch
- Goal: To create a standardized CubeSat platform that will work with any payload
- 100% in orbit, mission success rate

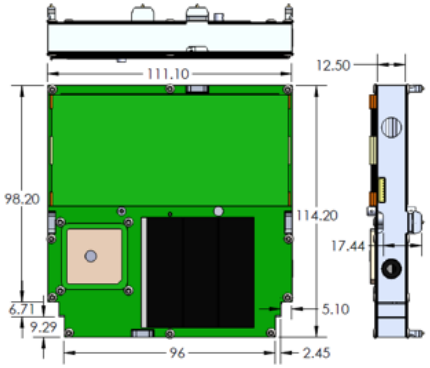


24W, Successful Mission

ThinSat Program

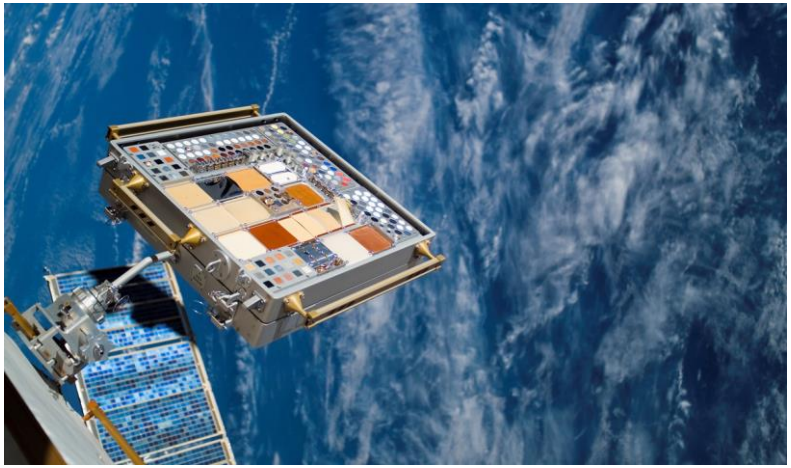
- Virginia Space, Twiggs Space Lab, Orbital ATK, and NASA Wallops Flight Facility
- Short-term missions completed in one school year
- Multiple ThinSats are linked together into strings
- 5 days of orbit life in Extreme Low Earth Orbit (200-250km)
- Constellation of 60 ThinSat units launched on the April 17 NG-11





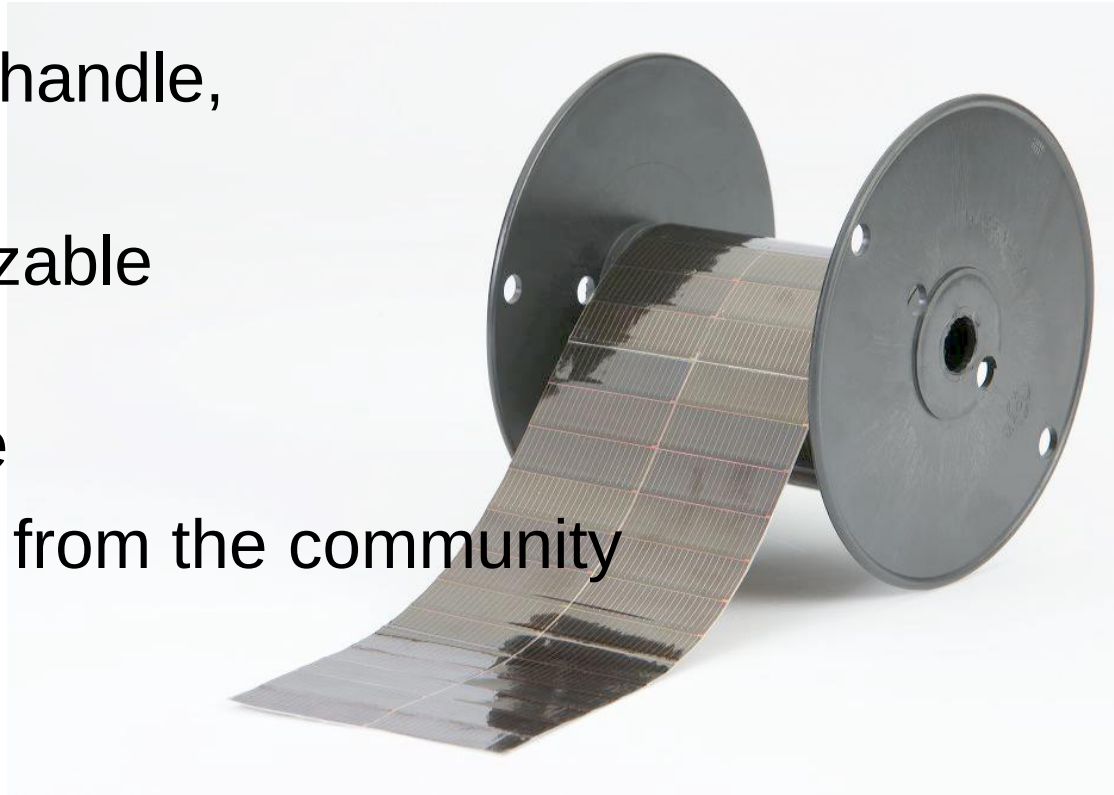
Materials International Space Station Experiment

- Recently completed a six month flight aboard the ISS
  - Atomic Oxygen
  - Ultraviolet Exposure
  - Extreme Temperature Cycling
  - Radiation
- NASA has selected Alta Devices for MISSE 10



Summary

- New type of solar cell
- Thin, flexible, easy to handle, easy to integrate
- High volume, customizable configurations
- Building flight heritage
- Inviting collaborations from the community



Questions?

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