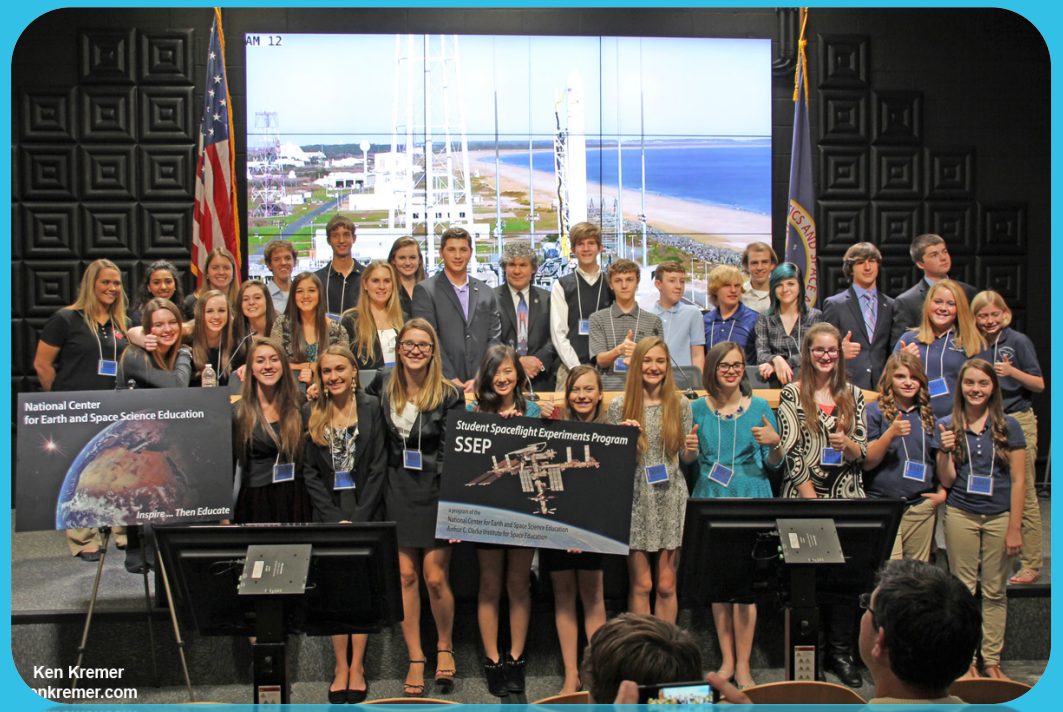
# MIXSTIX

DREAMUP, PBC



# WHAT ARE MIXSTIX?

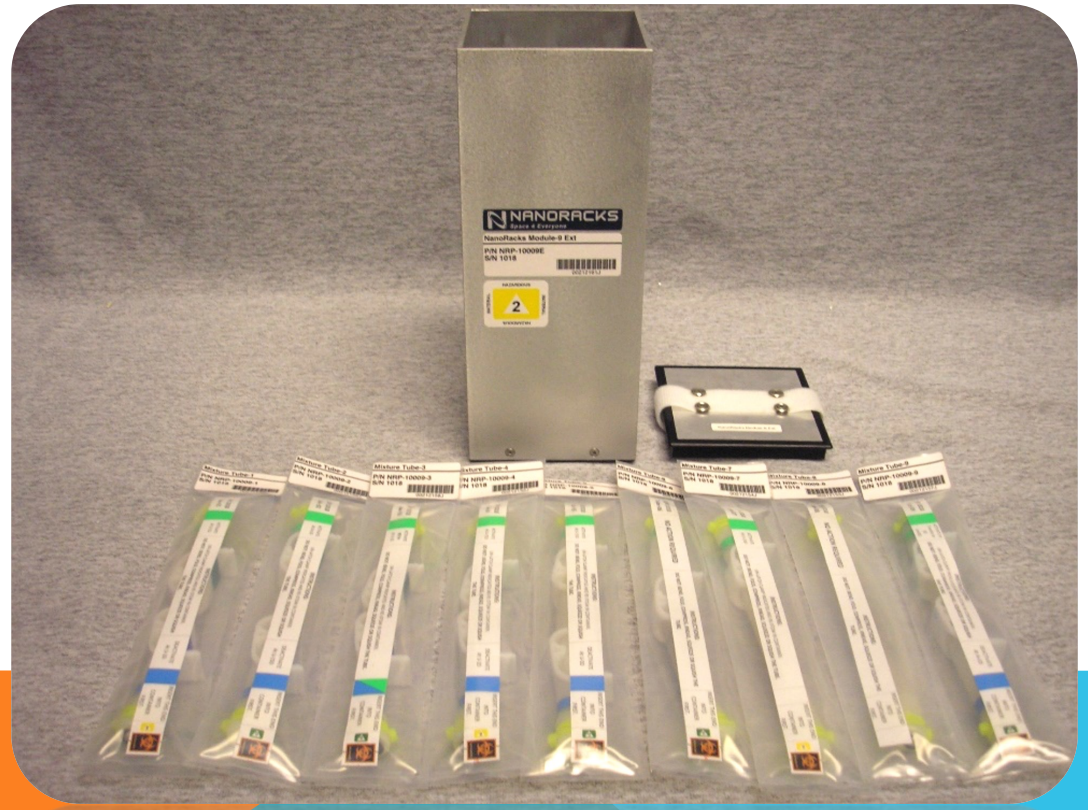
- MixStix are simply mixture enclosure tubes – keep fluids, materials, chemicals, biological materials separate, then see how they mix in space!
- Materials mix differently in microgravity – part of the mystery of the universe
- MixStix allow for single, double or triple experiment sample segments of adjustable sizes and the ability to open or close clamps at specified times
- Tubes can be shaken either gently or vigorously to facilitate mixing

# WHY MIXSTIX?

dreamUp

- Affordable microgravity research that gets returned to you
- Highly versatile—have been used by elementary schoolers and professional researchers alike and for all scientific disciplines
- Easy to assemble—a member of our team holds a video conference with your group to walk you through the loading process before you ship it to NanoRacks (our launch services provider)
- Keep a control experiment on Earth
- An astronaut will be directly interacting with your experiment!

# TECHNICAL DETAILS




- Designed for Fluid and Biological research onboard the ISS
- 10 ml Parylene Coated Silicon Tubes
- Provides the ability to keep materials separate until on-orbit
- Can be stowed frozen (-20C), cold (+4C), or ambient on launch, berth, pre & post operations, and on return.

# IMPROVE LIFE IN SPACE

- **Testing how bacterial biofilms form on contact lenses in microgravity**
  - (The Effect of Microgravity on Bacterial Biofilm Formation on Soft Contact Lenses - New Explorations into Science, Technology and Math, Grade 5, New York City, NY)
- **Studying a potential factor in rapid skin aging, impaired wound healing, and bone loss experienced by astronauts**
  - (Effect of Matrix Metalloproteinase-1 on Collagen Integrity in Microgravity - Treasure Valley Mathematics and Science Center, Grade 7, Boise, ID)
- **Determining whether ASM contributes to muscle atrophy in spaceflight**
  - (Levels of Sphingomyelinase (ASM-2) in Caenorhabditis Elegans in Microgravity - University of Toronto Schools, Grades 8 and 12, Toronto, Ontario, Canada)

# BIOLOGY EXAMPLES

**Plant growth (often seeds, water, and a growth substrate)**

- Sunflower seeds
- Red clover
- Algae reproduction

**Animals (often eggs/larvae, an agar or food substance, and formaldehyde for preservation)**

- Tardigrades
- Ladybugs
- Drosophila

**Bacteria (often a strain sample and antibiotic)**

- Staphylococcus epidermis
- E. coli
- Lactobacillus

# CHEMISTRY EXAMPLES

Paper chromatography

Formation of tin whiskers on solder

Breakdown of hydrogen peroxide

Rust formation

# WHY DREAMUP?

**myLAUNCH**

- DreamUp will host you at your payloads launch!
- Providing you a full VIP experience – with tours, events, special viewing, and more

**Alumni Program**

- Think your school's alumni would like to help sponsor a research experiment? We've got materials ready to help get them involved
- Blue Origin is a great platform for alumni to sponsor – very affordable rate, and you'll be among the first to launch on the world's hottest rocket

**Access to DreamUp Network**

- We've launched over nearly 375 experiments to the ISS, so we've got a big network!
- Over 70,000 students engaged
- We are building a community of students and alumni who want to push STEM education to new boundaries, and create exciting opportunities for every student

# AUTOMATED MIXSTIX

- **Automated MIxStix are autonomous, so they operated without the need of human interaction.**
  - This is ideal for more precise science needs that can't allow for human fluctuations
  - We get get shaking/movement of the stick down to an exact time
- **Reusable**
  - Even in space, we are trying to be more eco-friendly!
- **Wider flow channel for better mixing – allows you to use different fluids and materials in the tubes**

# FLIGHT OPPORTUNITIES: BLUE ORIGIN

- Suborbital flight – means the rocket goes up, experience microgravity for a few minutes at the edge of space, then comes back down
- Frequent flights – multiple times per year, and eventually every 6 weeks
- You can get your experiment back on the same day!
- Shorter, more simple safety review that payloads destined for Station
- Fit an experiment into your school year curriculum timeline
- Our most affordable price point – and the perfect test platform before committing to the ISS


# FLIGHT OPPORTUNITIES: ORBITAL ATK & SPACEX

dreamUp

**To the International Space Station**

- ~30 day mission duration is standard, but can be extended
- Flights approximately every quarter from each provider
- Rockets launch from Wallops Island, Virginia and Cape Canaveral, Florida
- NASA Safety Process – Three Phases
- Payloads can be returned on SpaceX's Dragon capsule
- MixStix operated via NanoRacks, who books time with the astronauts

# DARE TO DREAM WITH DREAMUP!

www.DreamUp.org

**Thanks! We look forward to bringing your students' dreams to space.**

**Contact:** info@dreamup.org

# NANORACKS OPERATIONS

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Safety Review

Launch

Delivery

On-Orbit Operations

Return

Landing

Retrieval

Receive At NanoRacks