

POLY

CME

NASA STEM  
SUSTAINABILITY

SFMM

# 8/16 · Earth and Space Sustainability Summit

AIR PRODUCTS



BLAVATNIK  
FAMILY FOUNDATION



BASF  
We create chemistry

Industry  
Sustainability  
and Resiliency

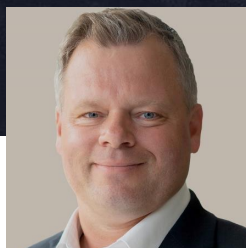
The Next  
Phase in Life  
Sciences

Creating a  
Sustainable Future  
in Space

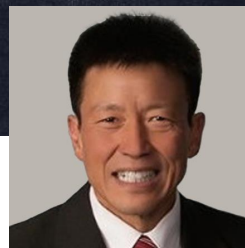
## Speakers



Jon Arenberg  
Northrop Grumman



Benjamin Knudsen  
BASF



Tony Go  
ExxonMobil

8/16/2023 | 12:30 – 5:30 pm | SF Marriott Marquis | [www.CME-STEM.org](http://www.CME-STEM.org)

# 8/16 CME NASA Sustainability Earth & Space

San Francisco Marriott Marquis Golden Gate B | Registration: CME-STEM.org

Sustainable Living: Earth and Space			
Keynote - Host: George Rodriguez, ACS Fellow, CME Programs			
12:30 PM	Paul Anastas	Yale Chair of Chemistry for the Environment	Accelerating the Sustainable Space Age
Industry Sustainability and Resiliency			
1:00 PM	Benjamin Knudsen	BASF Vice President of Research, NA	Net Zero 2050, White Biotechnology and Super Computers
1:10 PM	Tony Go	ExxonMobil Chief Engineer, Novel Processes	Energy Transition Challenges and Opportunities
1:20 PM	Panel Discussion	Moderator: Shah Karim, SafeRock CEO, CME Officer	
The Next Phase in Life Sciences Evolution			
2:00 PM	Valerie Patrick	Fulcrum Connection President	Sustainable Innovation Leadership in Life Sciences
2:10 PM	Chris Clove	MIT Koch Institute Professor of Chemical Engineering	Global Discovery and Manufacturing of Biologic Medicines
2:20 PM	Panel Discussion	Moderator: Ksenia Takhistova, CME Co-Chair	
3:00 PM	Intermission		
Shaping Disruptive Technologies			
3:20 PM	Jon Arenberg	Northrop Grumman Chief Mission Architect, Science and Robotic Exploration	Space Living: The Next Big Leap in Sustainability
3:25 PM	Brooke Stokes	McKinsey Partner Aerospace & Defence	Creating Thriving Ecosystems for Novel Technologies
3:30 PM	Bruce Pittman	NASA Ames Portal Member	Leveraging Disruptive Technologies for Space Exploration
3:35 PM	Panel Discussion	Moderators: George Rodriguez, CME Programs, and Jana Stoudemire, Axiom Space Director	
Creating a Sustainable Future in Space			
4:15 PM	Elizabeth Barrios	NASA Avionics Materials Engineer	Engineering Safety and Sustainability in Space Materials
4:20 PM	Luis Zea	Sierra Space, Sr. BD Mgr, In-Space R&D	Boundless In-Space Research
4:25 PM	Jana Stoudemire	Axiom Space Director, In-Space Manufacturing	Advancing the Low-Earth Orbit (LEO) Economy
4:30 PM	Panel Discussion	Moderators: Steve Barnett, CME Co-Chair, and Jana Stoudemire, Axiom Space Director	
5:30 PM	Steve Barnett	ConnellFoley EHS Partner, CME Co-Chair	Closing Remarks

## Earth & Space Sustainability

Partial List of Leaders Propelling Diverse STEM Talent for Sustainable Innovation



**Samir Serhan**

Air Products

Chief Operations Officer



**Jana Stoudemire**

Axiom Space

Director, In-Space  
manufacturing)



**Paul Anastas**

Yale University

Chair of Chemistry for the  
Environment



**Tony Go**

ExxonMobil

Chief Engineer of Novel  
Processes



**Jon Arenberg**

Northrop Grumman

Chief Mission Architect for  
Science and Robotic Exploration



**Benjamin Knudsen**

BASF

Vice President of Research in  
North America



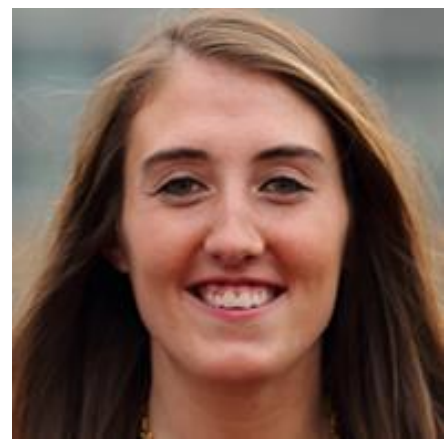
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# Sustainability & Reception

Partial List of Leaders Propelling Diverse STEM Talent for Sustainable Innovation



Elizabeth Barrios

NASA

Avionics Materials Engineer

Bruce Pittman

NASA

Ames Research Space Portal

Brooke Stokes

McKinsey

Partner, Aerospace & Defense

2022 Reception in Chicago

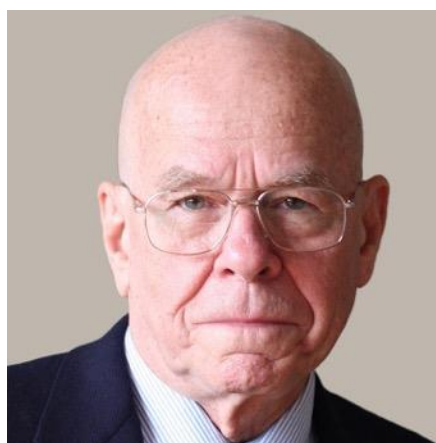


## 2017-2023 CME Nobel Lectures

Partial List of Featured Eminent Thought Leaders



**Sir Fraser Stoddart**  
Northwestern University  
2016 Nobel Prize in Chemistry



**Barry Sharpless**  
Scripps Research Institute  
2001 and 2022 Nobel Prize in Chemistry



**Frances Arnold**  
Caltech  
2018 Nobel Prize in Chemistry



**Ben Feringa**  
University of Groningen  
2016 Nobel Prize in Chemistry



**Robert Grubbs**  
Caltech  
2005 Nobel Prize in Chemistry



**Eric Betzig**  
University of California Berkeley  
2014 Nobel Prize in Chemistry

## 2017-2023 Speakers

Partial list of distinguished thought leaders



**Janet Kavandi**  
 NASA Glenn Research Center  
 Director (Former Astronaut)



**Craig Venter**  
 Human Genome Project  
 Visionary Industry Scientist



**Robert Langer**  
 MIT  
 Koch Institute Professor; most cited engineer, 1400 patents



**Rich Tillyer**  
 Johnson & Johnson, Janssen  
 Global Head of Discovery



**Peter Eckes**  
 BASF Bioscience Research  
 President



**James Green**  
 NASA  
 Former Chief Scientist

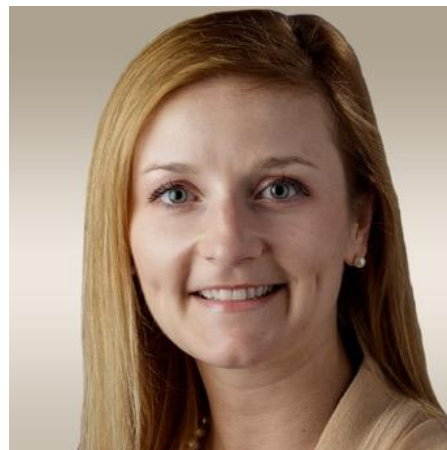
## 2023 Event Organizers

Creating STEM Events for the Space Age



**Steve Barnett**  
CME Co-Chair

Partner at Connell Foley LLP  
Aeronautical Eng., PE, JD



**Jennifer Gustetic**  
NASA

Director, Early-Stage Innovations  
and Partnerships



**George Rodriguez**  
CME Programming

Chemical Engineer, American  
2020 Chemical Society Fellow



**Shah Karim**  
CME Program Chair

SafeRock CEO  
PME Advisory Board Member



**Ksenia Takhistova**  
CME Co-Chair

Technology IP Attorney;  
Mechanical & Chemical Engineer



**Michael Meador**  
NASA Glenn

Former Game Changing Manager

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Marquis

# 8/16 AM · Space Chemistry Roadmap

(By invitation only)

$$U = -\frac{W_{\infty}}{m} = -\frac{1}{m} \int_{\infty}^r \mathbf{F} \cdot d\mathbf{r}$$

$$r_{\text{cog}} = \frac{1}{M} \sum_i m_i r_i$$

$$r_{\text{cog}} = \frac{1}{\sum_i m_i} \sum_i m_i r_i$$

$$r_{\text{cog}} = \frac{1}{\sum_i m_i} \sum_i r_i m_i$$

AIR PRODUCTS

DOW

BLAVATNIK  
FAMILY FOUNDATION

MERCK

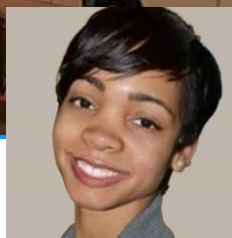
BASF  
We create chemistry

Keynote

Speakers



Brad Carpenter  
NASA



Chyree Bartton  
Axiom Space



Ferenc Darvas  
InnoStudios



Ken Savin  
Redwire

8/16/2023 8:00-11:30 AM | Space Chemistry Roundtable | By invitation only





# ACS Fall 2023: POLY Three Days 8/14-16 CME NASA



Advancing Materials for Human Space Exploration

8/14-15 · CME NASA Symposium

8/14 AM · NASA Day PM · CME PMSE Student Awards

8/15 · Industry Day-CME Lectures & Awards

8/16 AM · Space Chemistry Roundtable

8/16 PM · CME NASA Sustainability & Reception





# NASA STEM SYMPOSIUM

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Day 1 and 2 of Sustainable Innovation

# Advancing Materials for Human Space Exploration



- AGFD ENVR
- AGRO FLUO
- ANYL GEOC
- BIOL HIST
- BIOT I&EC
- BMGT INOR
- CARB MEDI
- CATL NUCL
- CELL ORGN
- CHAS PHYS
- CHED PMSE
- CINF POLY
- COLL PROF
- COMP SCHB
- ENFL TOXI



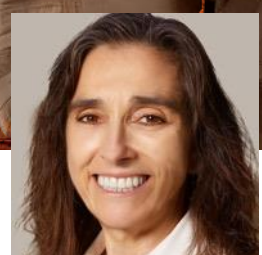
BLAVATNIK FAMILY FOUNDATION



8/14 PMSE CME Student & Mentor Awards

8/15 CME Lectures Leadership Awards

### Speakers



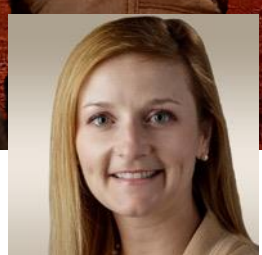
Kimberly Budil  
LLNL



Barry Sharpless  
Scripps



Paul Anastas  
Yale



Jennifer Gustetic  
NASA



scan me

Registration: [www.CME-STEM.org](http://www.CME-STEM.org)

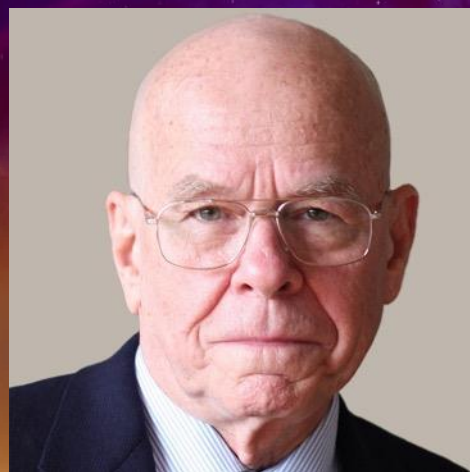
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SYMPOSIUM

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Advancing Materials for Human Space Exploration

# 8/15 CME Nobel Lecture



## Barry Sharpless

The Scripps Research Institute Professor  
One of the Exceptional Two-Nobel-Prize Laureates  
Curie · Pauling · Bardeen · Sanger · Sharpless

## Click Chemistry: New Directions

**Abstract** Click chemistry was defined by Kolb, Finn, and Sharpless in a 2001 *Angewandte Chemie* article. It has evolved substantially since then, to the point of having applications in most all fields of pure and applied chemistry. Today I highlight the properties of some SuFEx polysulfate polymers which have emerged in a collaboration between Scripps and the Molecular Foundry Lab at Berkeley. The phenomenon mediated by these polymers is to shield electric capacitors from the destructive effects of both high temperatures and high electric fields, more effectively than the existing materials for this purpose. The question is, how can a thin film of polymer, a condensed chemical phase, shield against the electromagnetic field force of physics. Our latest results and thoughts are presented.

# Day 1 · 8/14 CME NASA Symposium

## PMSE CME Student & Mentor Awards

### Advancing Materials for Human Space Exploration

8/14 AM - POLY023A - NASA Day One - SF Marriott Marquis Salon 7 (go to [cme-stem.org](http://cme-stem.org) for bios, abstracts and updates)

8:00 AM	Steve Barnett	CME Co-Chair	Opening Remarks
8:01 AM	Boyu Yang	Capital Medical University, Beijing	Mechanism of Porous Se@SiO <sub>2</sub> Nanospheres inducing cuproptosis in CRPC
8:20 AM	Tane Boghuzian	NASA HQ	Development of Additive Manufacturing Technologies for 3D Printing of Spacecraft Heat Shields
8:45 AM	Cameroun Sherrard	NASA Marshall Space Flight Center	NASA's SIBatt-3D: In-Space and On-Surface 3D Printing Sodium-Ion Batteries from ISRU Materials
9:10 AM	Ciera Cipriani	Texas A&M University	3D Printing Polyimide Aerogels for Hierarchical Porosity
9:35 AM	Steve Barnett	CME Co-Chair	Intermission
9:55 AM	Kirk Schanze	U of Texas at San Antonio	Luminescent Coatings for Aerodynamic Applications
10:20 AM	Burcu Gurcan	Case Western Reserve U	Sorbents for CO <sub>2</sub> Capture from Air
10:45 AM	Mahmooda Sultana	NASA Goddard Space Flight Center	Parts-per-Billion Detection of Gases and Volatiles with Hybrid Multifunctional Nanosensor Platform
11:10 AM	Steven Snyder	NASA Langley Research Center	AeroFusion: Data Fusion and Uncertainty Quantification for Entry Vehicles
11:35 AM	Keith Parrish	NASA Goddard Space Flight Center	Cryogenic Materials Development for the James Webb Space Telescope's Large Deployable Sunshield
12:00 AM	Steve Barnett	CME Co-Chair	Session Adjourns

8/14 PM - POLY023B - Pluripotent Polymers, CME PMSE Students & Mentor Awards - SF Marriott Marquis Salon 7

2:00 PM			Introductory Remarks
2:01 PM	Stuart Rowan	University of Chicago	Dynamic Networks as a Route to Access Pluripotent Materials
2:30 PM	Cheol Park	NASA	Multifunctional Structural Materials for Sustainable Human Exploration in Extreme Space Environments
3:00 PM	Steve Barnett	CME Co-Chair	Intermission
3:10 PM	George Rodriguez	CME Programming	CME PMSE Student & Mentor Award Presentation
3:25 PM	Alexandra Easley	Cornell University	Design of Macromolecular Radicals for Next Generation Energy Storage
3:55 PM	Jodie Lutkenhaus	Texas A&M University	Toward Sustainable Organic Polymer Batteries
4:25 PM	Timur Ashirov	University of Freiburg	Fast Light-Switchable Polymeric Carbon Nitride and Adsorptive Membranes for Tunable Gas Separation
4:55 PM	Ali Coskun	University of Freiburg	Supramolecular Sython Approach for High Capacity Electrodes in Lithium-ion Batteries
5:25 PM			Closing Remarks

# Day 2 · 8/15 CME NASA Symposium

## CME Lectures: Industry Academia Government

### Advancing Materials for Human Space Exploration

8/15 AM - POLY023C - Industry Panel and CME Nobel Lecture - SF Marriott Marquis Salon 7 (go to [cme-stem.org](http://cme-stem.org) for bios, abstracts, updates)

8:00 AM			Introductory Remarks
8:00 AM	Anna Douglas	SkyNano	Sustainable Approach to Carbon Management to Enable Our Energy and Economic Transition
8:25 AM	Tony Go	ExxonMobil	Advanced Recycling - Meeting the Needs of Plastic Recycling Today and Tomorrow
8:50 AM	Jonathan Arenberg	Northrop Grumman	Polymers and Their Roles in Space Astronomy
9:15 AM	Benjamin Knudsen	BASF	Harnessing the Power of Data through QURIOSITY
9:40 AM	Shah Karim	CME Officer	Panel on Advanced Technologies
10:05 AM			Intermission
10:20 AM	K Barry Sharpless	Scripps Research	Click Chemistry: New Directions
10:50 AM	George Rodriguez	CME Program Chair	CME STEM Leadership Awards Presentation
11:00 AM	Kim Budil	Lawrence Livermore National Laboratory	Accelerated Development of Advanced Materials for Diverse Mission Needs at Lawrence Livermore National Laboratory
11:30 AM	Chyree Batton	Axiom Space	Chemistry Beyond Gravity: Unlocking the Potential of Space Chemistry for Exploration and Industry

8/15 PM - POLY023D - Day 2 - Sustainability: Industry, Government, Academia - SF Marriott Marquis Salon 7

2:00 PM			Introductory Remarks
2:01 PM	Zhenan Bao	Stanford University	Bioelectronics Applications of Skin-Inspired Electronics
2:25 PM	Kamil Godula	UCSD	Hidden in Plain Slime: Finding Inspiration in Mucus for Building Synthetic Biological Interfaces.
2:50 PM	Rampi Ramprasad	Georgia Institute of Technology	Informatics-Driven Design of Polymers for Extreme Conditions
3:15 PM	Joseph Moebus	ExxonMobil	Polymer Structure Property with Machine Learning Models
3:40 PM			Intermission
3:50 PM	Paul Anastas	Yale University	Greenchem Innovation: What is Next?
4:15 PM	Jennifer Gustetic	NASA	Nurturing Innovation in Sustainability through Early-Stage Partnership Development at NASA
4:40 PM	Karen McDonald	UC Davis	Plant Molecular Farming to Support Human Life on the Moon, Mars, and Beyond
5:05 PM	Elizabeth Barrios	NASA	Using Lessons Learned to Create a Safer, More Sustainable Future in Space
5:30 PM	Ksenia Takhistova	CME Co-Chair	Panel Discussion on Sustainability
5:55 PM			Closing Remarks



# Award-Winning Space Age STEM Programs



Advancing Diversity and Environmental Social Governance

CME STEM Symposiums with NASA

CME STEM Leadership Awards

CME STEM Talks by Thought Leaders

CME STEM Festivals

