

# Negative Emissions Science

The First Annual Scialog Conference  
November 5-6, 2020

**scialog2020**<sup>®</sup>



Alfred P. Sloan  
FOUNDATION

RESEARCH CORPORATION  
*for* SCIENCE ADVANCEMENT





## Objectives

Engage in dialogue with the goal of accelerating high-risk/high-reward research.

Identify and analyze bottlenecks to advance fundamental understanding of negative emissions science and develop approaches for breakthroughs.

Build a creative, better-networked community that is more likely to produce breakthroughs.

Form teams to write proposals to seed novel projects based on highly innovative ideas that emerge at the conference.

## Process

Brainstorming is welcome; don't be afraid to say what comes to mind.

Consider the possibility of unorthodox or unusual ideas without immediately dismissing them.

Discuss, build upon and constructively criticize each other's ideas – in a spirit of cooperative give and take.

Make comments concise to avoid monopolizing the dialogue.

## Diversity, Inclusion and No Harassment

Research Corporation for Science Advancement fosters an environment for listening and considering new ideas from a diverse group, with respect for all participants without regard to gender, race, ethnicity, sexual orientation, age or any other aspect of how we identify ourselves other than as fellow scientists.

RCSA does not tolerate any form of harassment, which could include verbal or physical conduct that has the purpose or effect of substantially interfering with anyone else's participation or performance at this conference, or of creating an intimidating, hostile, or offensive environment; any such harassment may result in dismissal from the conference.

# Scialog: Negative Emissions Science

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# Scialog: Negative Emissions Science

## From the President

Welcome to the 2020 *Scialog: Negative Emissions Science* meeting, cosponsored by Research Corporation and the Alfred P. Sloan Foundation. This is the first of three Scialog meetings on this theme.

The goal of this Scialog is to catalyze experimentalists and theoretical modelers across multiple disciplines to collaborate on developing new and innovative projects to accelerate advances in the underlying science that will allow negative emissions technologies to become efficient, affordable, and scalable.

Scialog's overarching purpose is to advance cutting-edge science of great significance to humanity by catalyzing innovative, basic research leading to fundamental discoveries. Our focus is on scientists in the early years of their independent careers. Through the unique Scialog process, we seek to lay the foundation for an ongoing, highly creative, cross-disciplinary community of scientists that will prove adept at identifying exciting areas for research advances for decades to come.

To that end, under the guidance of Program Directors **Richard Wiener**, **Andrew Feig**, and **Silvia Ronco** of Research Corporation and **Evan Michelson** of the Sloan Foundation, we hope you will be engaged in passionate discussions with colleagues, many of whom you will have met for the first time at Scialog. The process may even push you out of your comfort zone with the goal of stimulating new and better ideas. The result, we expect, will be a meeting unlike others that you attend. We are confident that you will find the next few days to be extremely worthwhile.

This is your opportunity to air that wild idea you have been reluctant to share with others, or to discuss a nagging hunch that does not yet have sufficient supporting data, or to take a leap on a high-impact/high-risk project instead of concentrating all your effort on somewhat more "incremental" studies. This is the time to come up with, and be open to, completely new ideas that may truly change the world.

We hope this first meeting on this topic yields a crop of outstanding team proposals, which will make our job of determining who receives funding very challenging. I wish you every success in exploring new and compelling ideas over the next few days.

Have a terrific meeting!

**Daniel Linzer**

President

Research Corporation for Science Advancement

# Scialog: Negative Emissions Science

## From the Program Director

This year Research Corporation and the Alfred P. Sloan Foundation are cosponsoring the first annual meeting of *Scialog: Negative Emissions Science*. Research Corporation's highly interactive Scialog meetings have the goal of catalyzing new collaborations based on blue-sky ideas among Scialog Fellows who constitute a highly select group of exemplary early-career U.S. and Canadian scientists. The emphasis is on dialog, networking, and building new collaborations to pursue novel, high-risk discovery research. This meeting will be the first full Scialog held virtually. We are excited to hold the meeting virtually and will do our best to make it a great experience for participants.

Research Corporation and the Sloan Foundation chose to focus on Negative Emissions Science because we believe this critical area of science requires major breakthroughs in fundamental understanding of capturing and utilizing or sequestering carbon and other greenhouse gases in the atmosphere and oceans that will lead to a sustainable future. Just as firmly, we believe these breakthroughs can be accelerated by chemists, engineers, environmental scientists and those in related fields working collaboratively on novel, high-risk projects, particularly with modelers and experimentalists combining efforts.

We have an outstanding keynote speaker to set the stage for breakout discussions:

**Julia King**, University of Cambridge

We have a team of terrific discussion facilitators: **Roger Aines** (Lawrence Livermore), **Sarbajit Banerjee** (Texas A&M), **Jordi Cabana** (University of Illinois, Chicago), **Chris Jones** (Georgia Tech), **Jeff Long** (UC Berkeley), **Alissa Park** (Columbia), **George Shields** (Furman), and **Jennifer Wilcox** (WPI), along with **Julia King**.

We have representatives on hand as observers from several organizations with a strong interest in climate issues and science philanthropy. Please see the Conference Attendees section below for a complete list.

Scialog meetings focus on dialog and team building with the goal of creating novel strategies and collaborative approaches. An important feature is the opportunity for Scialog Fellows to form teams and write proposals to pursue particularly creative ideas that emerge. We hope this competition is exciting, but regardless of which proposals are funded, the primary purpose is to catalyze a deeper and more meaningful exchange of ideas than ordinarily occurs at scientific conferences. Our intent is for this process to help participants gain new insights and connections that significantly advance fundamental science to enable major advances in negative emissions technologies.

We hope each participant finds the Scialog experience of great value. Please do not hesitate to provide feedback on how to make the conference better. **Evan Michelson**, Program Director from the Sloan Foundation, my fellow RCSA Program Directors, **Andrew Feig** and **Silvia Ronco**, the RCSA staff, and I are here to help make Scialog a great experience!

**Richard Wiener**

Senior Program Director

Research Corporation for Science Advancement

# Scialog: Negative Emissions Science

## Conference Agenda (Optional activities in green)

November 5-6, 2020

(All times Mountain Standard; one hour later than Pacific & two hours earlier than Eastern)

### Thursday, November 5

8:00 – 9:00 am	<b>Early login</b> <b>Informal dialog</b> <b>BYO breakfast/lunch</b>	Zoom Main Room & Gather Rooms
9:00 – 9:10 am	<b>Welcome</b> Dan Linzer, <i>President, RCSA</i> Adam Falk, <i>President, Sloan Foundation</i>	Zoom Main Room
9:10 – 9:25 am	<b>Conference Overview &amp; Desired Outcomes</b> Richard Wiener, RCSA	Zoom Main Room
9:25 – 10:00 am	<b>Small Group Ice Breakers</b>	Zoom Breakout Rooms
10:00 – 10:35 am	<b>Keynote Presentation &amp; Discussion</b> Julia King, <i>University of Cambridge</i>	Zoom Main Room
10:35 – 10:50 am	<b>Break</b>	
10:50 – 11:00 am	<b>Directions for Breakout Sessions</b>	Zoom Main Room
11:00 am – 12:15 pm	<b>Breakout Session I</b>	Zoom Breakout Rooms
12:15 – 12:45 pm	<b>Report Out</b>	Zoom Main Room
12:45 – 2:00 pm	<b>Lunch</b>	Zoom Breakout Rooms
2:00 – 2:45 pm	<b>Mini Breakout Session I (Fellows only)</b>	Gather Rooms
2:45 – 3:00 pm	<b>Break</b>	
3:00 – 3:45 pm	<b>Mini Breakout Session II (Fellows only)</b>	Gather Rooms
3:45 – 5:30 pm	<b>Break</b>	
5:30 – 7:30 pm	<b>Social Mixer</b>	Gather Rooms

### Friday, November 6

8:00 – 9:00 am	<b>Early login</b> <b>Informal dialog</b> <b>BYO breakfast/lunch</b>	Zoom Main Room & Gather Rooms
9:00 – 10:15 am	<b>Breakout Session II</b>	Zoom Breakout Rooms
10:15 – 10:45 am	<b>Report Out</b>	Zoom Main Room
10:45 – 11:00 am	<b>Break</b>	
11:00 – 12:15 pm	<b>Breakout Session III</b>	Zoom Breakout Rooms
12:15 – 12:45 pm	<b>Report Out</b>	Zoom Main Room
12:45 – 1:00 pm	<b>Discussion of Proposal Writing</b>	Zoom Main Room
1:00 – 2:00 pm	<b>Lunch</b>	Zoom Breakout Rooms
2:00 – 2:45 pm	<b>Mini Breakout Session III (Fellows only)</b>	Gather Rooms
2:45 – 3:00 pm	<b>Break</b>	
3:00 – 3:45 pm	<b>Mini Breakout Session IV (Fellows only)</b>	Gather Rooms
3:45 – 5:30 pm	<b>Break</b>	
5:30 – 7:30 pm	<b>Social Mixer</b>	Gather Rooms

## 2020 Proposal Guidelines & Collaborative Awards

### Scialog: Negative Emissions Science

1. Awards are intended to provide seed funding for teams of two to three Scialog Fellows formed at this conference for high-risk, high-impact projects.
2. Two-page proposals should describe the project and role of each team member. No budget is necessary. A third page may be used for references.
3. Awards will be in the amount of \$50K direct funding per team member, plus a small percentage for overhead. Grant duration will be one year.
4. No Scialog Fellow can be a member of more than two teams. If a Scialog Fellow is a member of two teams, other members of the teams must be different. No team can submit more than one proposal.
5. No Scialog Fellow who previously has won a Scialog NES Collaborative Award can be a member of more than one team. The other team members must be different from the members of the previously awarded team (Applies to Years 2 and 3).
6. Teams cannot include members who have previously collaborated with one another. If you are unsure of your status (e.g. prospective team members were part of a large collaboration but didn't significantly interact), please check for clarification with an RCSA program director.
7. Teams are encouraged (but not required) to:
  - a) Include members with different research approaches and methods.
  - b) Include members from different disciplines.
8. Proposals must be submitted electronically by Friday Nov. 13. Instructions for submission will be provided at the meeting.
9. Awards are anticipated to start in winter 2021.

## Scialog Fellows

**Ashleigh Baber** [baberae@jmu.edu](mailto:baberae@jmu.edu)

Chemistry and Biochemistry, James Madison University  
*Using surface science to optimize model catalysts for selective chemical reactions and study the fundamentals of molecular interactions on surfaces.*

**Praveen Bollini** [ppbollini@uh.edu](mailto:ppbollini@uh.edu)

Chemical and Biomolecular Engineering,  
University of Houston  
*CO<sub>2</sub> capture and conversion.*

**William (Will) Bowman** [will.bowman@uci.edu](mailto:will.bowman@uci.edu)

Materials Science and Engineering,  
University of California, Irvine  
*We use advanced electron microscopy to understand and design atomic- and nano-scale phenomena underlying the behaviors of energy materials.*

**Nanette Boyle** [nboyle@mines.edu](mailto:nboyle@mines.edu)

Chemical and Biological Engineering,  
Colorado School of Mines  
*Photocatalytic conversion of carbon dioxide to bioproducts with algae and cyanobacteria.*

**Fikile (Fik) Brushett** [brushett@mit.edu](mailto:brushett@mit.edu)

Chemical Engineering, MIT  
*We're interested in the science and engineering of electrochemical systems that enable a sustainable energy economy.*

**Rob Coridan** [rcoridan@uark.edu](mailto:rcoridan@uark.edu)

Department of Chemistry, University of Arkansas  
*We use modeling, machine learning, and soft-matter interparticle interactions to develop scalable new electrode structures for photoelectrochemical solar fuels applications.*

**Pratik Dholabhai** [pratik.dholabhai@rit.edu](mailto:pratik.dholabhai@rit.edu)

School of Physics and Astronomy,  
Rochester Institute of Technology  
*Computational materials scientist with expertise in application and development of atomistic simulation methods to design materials.*

**Greeshma Gadikota** [gg464@cornell.edu](mailto:gg464@cornell.edu)

School of Civil and Environmental Engineering,  
Cornell University  
*Innovative low carbon energy and resource conversions; carbon capture, utilization and storage; subsurface energy science and engineering.*

**Betar Gallant** [bgallant@mit.edu](mailto:bgallant@mit.edu)

Mechanical Engineering, MIT  
*Integration of CO<sub>2</sub> capture and electrochemistry to facilitate new storage and utilization concepts, accelerating mineralization and permanent storage.*

**Rebecca Gieseking** [gieseking@brandeis.edu](mailto:gieseking@brandeis.edu)

Department of Chemistry, Brandeis University  
*Quantum mechanical modeling of photochemical and electrochemical electron transfer; plasmon-enhanced catalysis.*

**Robert Gilliard** [rjg8s@virginia.edu](mailto:rjg8s@virginia.edu)

Department of Chemistry, University of Virginia  
*Main-Group- and Carbene-Mediated Strategies for Carbon Dioxide Reduction.*

**Christopher (Chris) Gorski** [gorski@psu.edu](mailto:gorski@psu.edu)

Civil and Environmental Engineering, Penn State  
*I am interested in developing, analyzing, and comparing electrochemical systems used for carbon capture based on thermodynamics and rates.*

**Matthew (Matt) Green** [mdgreen8@asu.edu](mailto:mdgreen8@asu.edu)

Chemical Engineering, Arizona State University  
*The Green Lab integrates macromolecular design and controlled synthesis to create hierarchical, multifunctional materials and systems for CO<sub>2</sub> capture.*

**Burcu Gurkan** [beg23@caae.edu](mailto:beg23@caae.edu)

Chemical and Biomolecular Engineering,  
Case Western Reserve University  
*Interfacial and bulk structure of concentrated electrolytes; Solvation and transport in ionic liquids and deep eutectic solvents; Gas separations and sensors.*

**Kelsey Hatzell** [kelsey.b.hatzell@vanderbilt.edu](mailto:kelsey.b.hatzell@vanderbilt.edu)

Mechanical Engineering, Vanderbilt University  
*Transport and kinetic properties at active solid|Liquid and solid|solid Interfaces.*

**Marta Hatzell** [marta.hatzell@me.gatech.edu](mailto:marta.hatzell@me.gatech.edu)

Mechanical Engineering, Georgia Tech  
*We investigate the thermodynamics and interface science of next generation electrochemical technologies for sustainable food, energy and water production.*

**Andrea Hicks** [hicks5@wisc.edu](mailto:hicks5@wisc.edu)

Civil and Environmental Engineering,  
University of Wisconsin-Madison  
*The environmental impacts of negative emission technologies, and determining environmental break-even points as a function of materials, energy, and scale.*



## Scialog Fellows Continued

**Caleb Hill** [caleb.hill@uwyo.edu](mailto:caleb.hill@uwyo.edu)

Department of Chemistry, University of Wyoming  
*The development and application of analytical methods to characterize the chemical and physical behavior of individual nanoscale entities.*

**Adam Holewinski** [adam.holewinski@colorado.edu](mailto:adam.holewinski@colorado.edu)

Chemical and Biological Engineering,  
University of Colorado - Boulder  
*Catalysis, kinetics, spectroscopy, biomass conversion, electro-organic chemistry.*

**Katherine Hornbostel** [hornbostel@pitt.edu](mailto:hornbostel@pitt.edu)

Mechanical Engineering and Materials Science,  
University of Pittsburgh  
*Membrane development for direct ocean capture; direct air capture using metal-organic-frameworks; designing negative emissions power plants.*

**Shu Hu** [shu.hu@yale.edu](mailto:shu.hu@yale.edu)

Chemical and Environmental Engineering,  
Yale University  
*Catalysis, modeling and reactor engineering, in situ IR and x-ray spectroscopy.*

**Jianbing (Jimmy) Jiang** [jiangjb@ucmail.uc.edu](mailto:jiangjb@ucmail.uc.edu)

Department of Chemistry, University of Cincinnati  
*The research interest in my group focuses on using molecular engineering strategy to understand the mechanisms of CO<sub>2</sub> electroreduction and to enhance the overall catalytic efficiency.*

**Feng Jiao** [jjiao@udel.edu](mailto:jjiao@udel.edu)

Chemical and Biomolecular Engineering,  
University of Delaware  
*The Jiao group develops novel electrochemical reactors for solving critical issues in carbon utilization and sustainable chemical production.*

**Kathryn (Katie) Knowles** [kknowles@ur.rochester.edu](mailto:kknowles@ur.rochester.edu)

Chemistry, University of Rochester  
*Synthesis and fundamental study of the photophysical and electrochemical properties of first-row transition metal oxide nanomaterials.*

**David (Dave) Koweek** [david.koweek@oceanvisions.org](mailto:david.koweek@oceanvisions.org)

Ocean Visions  
*How much of a role can the oceans play in solving our climate crisis?*

**David Kwabi** [dkwabi@umich.edu](mailto:dkwabi@umich.edu)

Mechanical Engineering, University of Michigan  
*Design and study of chemically functionalized interfaces and materials for low-cost batteries and electrochemical devices for energy-efficient separations.*

**Simona Liguori** [sliguori@clarkson.edu](mailto:sliguori@clarkson.edu)

Department of Chemical and Biomolecular Engineering,  
Clarkson University  
*Liguori's research interests are in carbon-neutral and carbon-free energy production associated with carbon capture technology to power a sustainable future.*

**Feng Lin** [fenglin@vt.edu](mailto:fenglin@vt.edu)

Chemistry, Virginia Tech  
*Tailoring the electrochemical processes in batteries, electrocatalysis, and smart windows.*

**Li-Chiang Lin** [lin.2645@osu.edu](mailto:lin.2645@osu.edu)

Chemical and Biomolecular Engineering,  
The Ohio State University  
*Employing molecular simulations and ab initio calculations to pose computation-driven material discoveries with atomic-level understandings.*

**Chong Liu** [chongliu@chem.ucla.edu](mailto:chongliu@chem.ucla.edu)

Department of Chemistry and Biochemistry,  
University of California, Los Angeles  
*Inorganic chemist. Integrating chemistry and biology for electrochemical applications of negative emission and small molecule activation.*

**Tianbiao (Leo) Liu** [leo.liu@usu.edu](mailto:leo.liu@usu.edu)

Chemistry and Biochemistry, Utah State University  
*Maximize the utilization of renewable energy (solar and wind) and produce chemical fuels and valuable products using abundant raw materials, such as N<sub>2</sub>, CO<sub>2</sub>, and water.*

**Yuanyue Liu** [yuanyue.liu@austin.utexas.edu](mailto:yuanyue.liu@austin.utexas.edu)

Mechanical Engineering, University of Texas at Austin  
*Computational chemistry focusing on electrochemistry at solid-liquid interface by advanced first-principles atomistic modelling.*

**Oana Luca** [oana.luca@colorado.edu](mailto:oana.luca@colorado.edu)

Chemistry, University of Colorado Boulder  
*We are interested in the electrochemical conversion of waste chemical feedstocks into valuable products.*

**Shaama Mallikarjun Sharada** [ssharada@usc.edu](mailto:ssharada@usc.edu)

Chemical Engineering and Materials Science,  
University of Southern California  
*Using quantum chemistry and machine learning to understand underlying electron transfer processes and drive discovery of organic photoredox catalysts for CO<sub>2</sub> reduction.*

## Scialog Fellows Continued

**Jarad Mason** [mason@chemistry.harvard.edu](mailto:mason@chemistry.harvard.edu)  
Department of Chemistry and Chemical Biology,  
Harvard University  
*Manipulating porosity and phase transitions in metal-organic materials for energy-related applications.*

**Ellen Matson** [matson@chem.rochester.edu](mailto:matson@chem.rochester.edu)  
Chemistry, University of Rochester  
*Synthesis of multi-metallic clusters for the conversion of energy poor substrates to energy rich fuels.*

**Charles McCrory** [cmccrory@umich.edu](mailto:cmccrory@umich.edu)  
Chemistry, University of Michigan  
*The McCrory Lab focuses on electrochemical conversions of small molecules relevant to energy and environmental chemistry.*

**Andrew (AJ) Medford** [ajm@gatech.edu](mailto:ajm@gatech.edu)  
Chemical and Biomolecular Engineering,  
Georgia Institute of Technology  
*Computational design of heterogeneous catalysts for nitrogen chemistry and fertilizer development.*

**Jose Mendoza** [jmendoza@msu.edu](mailto:jmendoza@msu.edu)  
Chemical Engineering and Materials Science, MSU  
*We created and applied Quantum Simulations, Materials by Design, and Big Data/Machine Learning to attack problem in pure sciences and engineering.*

**Phillip (Phill) Milner** [pjm347@cornell.edu](mailto:pjm347@cornell.edu)  
Chemistry and Chemical Biology, Cornell University  
*Prof. Milner's research interests involve drawing inspiration from reactivity patterns in organic synthesis to engineer new gas capture mechanisms within porous solid adsorbents.*

**Gary Moore** [gary.f.moore@asu.edu](mailto:gary.f.moore@asu.edu)  
School of Molecular Sciences, Arizona State University  
*My research interest include: catalysis, solar-energy transduction, hard-to-soft matter interfaces, and structure-function relationships.*

**Carlos Morales-Guio** [moralesguio@ucla.edu](mailto:moralesguio@ucla.edu)  
Chemical and Biomolecular Engineering, UCLA  
*From atomic scale catalysis to modular device. Multi-scale approach to the development of electrocatalytic systems for the production of fuels and chemicals.*

**Eva Nichols** [enichols@chem.ubc.ca](mailto:enichols@chem.ubc.ca)  
Chemistry, University of British Columbia  
*We study the local environment's role in homo/heterogeneous electrocatalytic CO<sub>2</sub>/CO reduction and use IR spectroscopy to probe mechanisms.*

**Michael Nippe** [nippe@chem.tamu.edu](mailto:nippe@chem.tamu.edu)  
Chemistry, Texas A&M University  
*Addressing global challenges by molecular design.*

**Valentina Prigiobbe** [vprigiob@stevens.edu](mailto:vprigiob@stevens.edu)  
Civil, Environmental, and Ocean Engineering,  
Stevens Institute of Technology  
*I am a geosystems and process engineer interested in particulate processes and flow and transport in porous media with applications to energy and water.*

**Fateme Rezaei** [rezaeif@mst.edu](mailto:rezaeif@mst.edu)  
Chemical and Biochemical Engineering, Missouri S&T  
*My research lies at the interface of chemical, materials science and environmental engineering, with the goal of development of advanced materials and processes for clean energy and sustainable chemical processes.*

**Emily Ryan** [ryanem@bu.edu](mailto:ryanem@bu.edu)  
Mechanical Engineering, Boston University  
*Computational modeling of reactive transport in multi-phase systems.*

**Rafael Santos** [santosr@uoguelph.ca](mailto:santosr@uoguelph.ca)  
School of Engineering, U. Guelph  
*Mineral carbonation approaches (ambient, accelerated, intensified) that provide the capacity and permanency to sequester many gigatonnes of CO<sub>2</sub>.*

**Kristen Schell** [kristen.schell@carleton.ca](mailto:kristen.schell@carleton.ca)  
Mechanical and Aerospace Engineering,  
Carleton University  
*My overarching research interest is in studying how to utilize renewable resources to power negative emissions technologies (NETs).*

**Marcel Schreier** [mschreier2@wisc.edu](mailto:mschreier2@wisc.edu)  
Chemical and Bioengineering / Chemistry,  
University of Wisconsin-Madison  
*The Schreier group takes a bottom-up approach to understand and tune electrocatalytic interfaces, expanding the scope of electricity-driven reactions.*

**Linsey Seitz** [linsey.seitz@northwestern.edu](mailto:linsey.seitz@northwestern.edu)  
Chemical and Biological Engineering,  
Northwestern University  
*Catalyst synthesis, mechanistic determination, in situ spectroscopy, and reactor design towards selective up-conversion of waste streams.*

## Scialog: Negative Emissions Science

**Wilson Smith** [wilson.smith@nrel.gov](mailto:wilson.smith@nrel.gov)

Chemistry and Nanoscience Center/Dept. of  
Chemical and Biological Engineering, NREL/CU Boulder  
*I am interested in scaling electrochemical processes that  
can contribute to negative emissions science, with a  
focus on integrating systems for optimized balance of  
plant operation.*

**Xiao Su** [x2su@illinois.edu](mailto:x2su@illinois.edu)

Chemical and Biomolecular Engineering,  
University of Illinois Urbana-Champaign  
*My research seeks to develop new functional materials  
for electrochemical separations, with a focus on  
achieving molecular selectivity.*

**Andrew Teixeira** [arteixeira@wpi.edu](mailto:arteixeira@wpi.edu)

Chemical Engineering, Worcester Polytechnic Institute  
*Using process intensification and next-generation  
reactor design to transform our energy and chemical  
infrastructure.*

**Jesus Velazquez** [jevelazquez@ucdavis.edu](mailto:jevelazquez@ucdavis.edu)

Chemistry, UC-Davis  
*Synthesis and electronic structure characterization of  
multidimensional solid-state materials and thin films for  
energy conversion and environmental remediation.*

**Venkat Viswanathan** [venkvis@cmu.edu](mailto:venkvis@cmu.edu)

MechE, Carnegie Mellon  
*All things that involve electrons and chemicals. Finding  
ways to electrify everything—transportation, aviation,  
chemicals and fuels production.*

**Haotian Wang** [htwang@rice.edu](mailto:htwang@rice.edu)

Chemical and Biomolecular Engineering, Rice University  
*My group's research is focused on developing novel  
catalytic materials and reactors to convert CO<sub>2</sub> into  
valuable chemical products.*

**Luisa Whittaker-Brooks** [luisa.whittaker@utah.edu](mailto:luisa.whittaker@utah.edu)

Chemistry, University of Utah  
*Synthesis and morphology control of 2D and 3D  
coordination polymers. Understanding electrochemical  
processes via in situ spectroscopy and diffraction.*

**Jenny Yang** [j.yang@uci.edu](mailto:j.yang@uci.edu)

Chemistry, UC Irvine  
*CO<sub>2</sub> capture and concentration, direct air, electrochemical  
methods, CO<sub>2</sub> as a feedstock to fuels.*

**Sen Zhang** [sz3t@virginia.edu](mailto:sz3t@virginia.edu)

Chemistry, University of Virginia  
*I am interested in developing catalysts for clean energy  
applications by studying how atomic structure affects their  
catalytic performance.*

## Discussion Facilitators

**Roger Aines** [aines@llnl.gov](mailto:aines@llnl.gov)  
Atmospheric, Earth, and Energy Division,  
Lawrence Livermore National Laboratory  
*Leads the Carbon Initiative at LLNL, which aims to understand, develop, and implement technologies for the removal of CO<sub>2</sub> from the atmosphere.*

**Sarbajit Banerjee** [banerjee@chem.tamu.edu](mailto:banerjee@chem.tamu.edu)  
Chemistry, Texas A&M University  
*Metastable solid-state compounds, accelerated mineralization, catalytic transformations, life cycle assessment.*

**Jordi Cabana** [jcabana@uic.edu](mailto:jcabana@uic.edu)  
Chemistry, University of Illinois at Chicago  
*We conduct research in inorganic solid state chemistry @thisisuic. Currently interested in materials for electrochemistry and energy.*

**Christopher Jones** [cjones@chbe.gatech.edu](mailto:cjones@chbe.gatech.edu)  
Chemical and Biomolecular Engineering, Georgia Tech  
*Direct air capture materials and processes, catalytic CO<sub>2</sub> conversion.*

**Julia King** [kingjb@parliament.uk](mailto:kingjb@parliament.uk)  
Engineering, Churchill College,  
University of Cambridge  
*Chair of the Carbon Trust and member of the House of Lords.*

**Jeffrey Long** [jrlong@berkeley.edu](mailto:jrlong@berkeley.edu)  
Chemistry and Chemical and Biomolecular Engineering,  
University of California, Berkeley  
*Our research focuses on the synthesis and characterization of new porous materials for potential applications in gas storage, molecular separations, catalysis, and energy storage.*

**Ah-Hyung (Alissa) Park** [ap2622@columbia.edu](mailto:ap2622@columbia.edu)  
Earth and Environmental Engineering and  
Chemical Engineering, Columbia University  
*Novel materials and sustainable reaction pathways for carbon capture, utilization and storage.*

**George Shields** [george.shields@furman.edu](mailto:george.shields@furman.edu)  
Chemistry, Furman University  
*Computational chemistry applied to important societal problems.*

**Jennifer (Jen) Wilcox** [jlwilcox@wpi.edu](mailto:jlwilcox@wpi.edu)  
Chemical Engineering, Worcester Polytechnic Institute  
*Carbon capture and negative emissions.*

## Guests

**Daniel (Danny) Abrams** [dmabrams@northwestern.edu](mailto:dmabrams@northwestern.edu)  
Engineering Sciences and Applied Mathematics,  
Northwestern University  
*Coupled oscillators and sociophysics (including mathematical modeling of conference dynamics).*

**Alexandra Basford** [alexandra.basford@alleninstitute.org](mailto:alexandra.basford@alleninstitute.org)  
The Paul G. Allen Frontiers Group  
*The Paul G. Allen Frontiers Group looks for new, breakthrough ideas in bioscience and directs research funding to help advance human health.*

**Elizabeth (Betsy) Cantwell** [ecantwell@arizona.edu](mailto:ecantwell@arizona.edu)  
Research, Innovation and Impact, University of Arizona  
*As the SVP at the University of Arizona, I am keenly interested in supporting the UA research portfolio and faculty awards towards greater engagement in this critical topic.*

**Peter Reiners** [reiners@arizona.edu](mailto:reiners@arizona.edu)  
Geosciences, College of Science, University of Arizona  
*My interests are in geochemistry of subsurface processes, particularly thermal histories and fluid-rock interaction.*

**Joaquin Ruiz** [jruiz@arizona.edu](mailto:jruiz@arizona.edu)  
R11/Biosphere 2, University of Arizona  
*Problems ranging from the origins of life to present-day climate change.*

**Elizabeth Weiss** [eweiss@sciphil.org](mailto:eweiss@sciphil.org)  
Science Philanthropy Alliance

**Daniel (Dan) Yawitz** [dan@climatepathfinders.org](mailto:dan@climatepathfinders.org)  
Grantmaking, Climate Pathfinders Foundation  
*Philanthropic funding opportunities to advance negative emissions.*

**Emma Zajdela** [emmazajdela@u.northwestern.edu](mailto:emmazajdela@u.northwestern.edu)  
Engineering Sciences and Applied Mathematics,  
Northwestern University  
*My research focuses on developing a data-driven mathematical model to understand the effectiveness of conferences at generating scientific collaborations and the dynamics of these collaborations over time.*

**Jane Zelikova** [jane@carbon180.org](mailto:jane@carbon180.org)  
Science, Carbon180  
*Interested in harnessing the carbon cycle to draw down carbon and mitigate climate change.*



## Alfred P. Sloan Foundation

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President

**Evan Michelson** michelson@sloan.org  
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