CLIMATE/CLOUD MODELING

GRAHAM FEINGOLD

Program Lead, Clouds, Aerosol, & Climate, NOAA Chemical Sciences Laboratory

Chemical Sciences Laboratory

Graham is a research scientist at NOAA's Chemical Laboratory in Boulder, Colorado. His interests lie in aerosol-cloud-precipitation interactions and implications for climate change. His focus is on process-level studies using high-resolution models and observations (aircraft and surface remote sensing) at the cloud scale (10s of meters to 10s of kms). Feingold was a lead author on the International Panel on Climate Change (IPCC) AR5 Chapter 7 (Clouds and Aerosols).[7]

Graham attends the biennial workshop, Aerosols and Clouds: Connections from the Laboratory to the Field to the Globe.

[7] https://csl.noaa.gov/staff/graham.feingold/

The Telluride Science & Innovation Center stands uniquely amongst the many workshops and conferences that compete for our attention. It gathers together small groups of scientists focused on specific science questions and provides a comfortable environment for grappling with ideas. The flow of information is slower, the engagement more meaningful, and the overall experience far more conducive to advancing science than other formats that I have experienced.

Graham Feingold
NOAA Chemical Sciences Laboratory

BATTERY INNOVATION FOR GRID STORAGE

SHIRLEY MENG

Professor of Molecular Engineering, University of Chicago & Chief Scientist for Argonne Collaborative Center for Energy Storage Science, Argonne National Laboratory

Shirely Meng

Shirley is focused on helping the US transition to a resilient electrical grid with terawatt-scale energy storage for deep renewable energy penetration that can be economically viable to deploy. Shirley also made a major breakthrough in battery technology by building a solid-state battery with an anode made out of silicon, a material with 10 times the energy density as the graphite anodes used today.[8]

Shirley attends the biennial Telluride Science workshop on Interfacial Chemistry and Charge Transfer for Energy Storage and Conversion. She is also the co-founder of the upcoming Telluride Innovation workshop series, Grid of the Future: Energy Storage on the Future Grid.

[8] https://news.uchicago.edu/crucial-race-build-better-battery-shirley-meng

Telluride is an inspiring place and has always spurred innovation. The landscape has changed dramatically from the mining industry with the creation of the first AC power plant in Telluride. Now, thanks to Telluride Science, it is where breakthrough science happens. These innovations started more than 100 years ago and continue today.

Shirley Meng
University of Chicago & Argonne National Laboratory

BATTERY MATERIALS FOR TRANSPORTATION

DONALD SIEGAL

University of Texas, Austin

University of Texas at Austin

Electrochemical batteries are a critical component of decarbonizing the transportation industry, where it is projected that by 2035 half the cars on the road will be electric.[9] For this to happen, battery technology must further develop to address current challenges like limited materials, battery life, recyclability, safety, and performance.

Don is a computational materials scientist whose research targets the development of electrical energy storage materials and lightweight alloys.[10]

Don co-organizes and attends the biennial Telluride Science workshop on Interfacial Chemistry and Charge Transfer for Energy Storage and Conversion.

He also co-founded and instructs the graduate-level summer school, the Telluride School on Electrochemical Storage. (Sponsored by Toyota)

[9] https://news.uchicago.edu/crucial-race-build-better-battery-shirley-meng

[10] https://www.me.utexas.edu/people/faculty-directory/siegel

Telluride Science workshops have been instrumental in helping me to identify new research directions and opportunities to collaborate. More so than at any other conference, Telluride Science workshops give participants the opportunity to dive deeply into the latest scientific developments, with abundant time to discuss — and debate! — with experts in the field. These interactions have been invaluable in helping my research ask the right questions and maximize its benefits to society.

Don Siegal
University of Texas, Austin

HYDROGEN FUEL CELLS

PLAMEN ATANASSOV

Chancellor's Professor, Department of Chemical & Biomolecular Engineering, UC Irvine

UCI Samueli School of Engineering

Clean hydrogen is part of the U.S. Department of Energy's (DOE) strategy to address difficult-to-decarbonize sectors of the economy, including industrial applications, heavy transportation and shipping sector, and aspects of the US electrical grid.[11]

Plamen's materials for energy programs are focused on the development of novel electrocatalysts for hydrogen fuel cells and enabling technologies for energy conversion and storage.

Currently, Plamen is engaged in several major DOE initiatives, helping to build California's hydrogen hub. He is also a co-principal investigator with the Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES), interfacing with hydrogen technology demonstrations and research efforts both regionally and nationwide.

Plamen co-organizes and attends the annual Telluride Science workshop on Platinum Group Metal and Platinum Group Metal-free Electrocatalysts: Catalyst/Ionomer Interactions.

[11] https://www.hydrogen.energy.gov/library/roadmaps-vision/clean-hydrogen-strategy-roadmap

The wonderful combination of the coziness of a small gathering and the vastness of the sky over Telluride gives us the ability to think in different ways. I'm really thankful to Telluride Science for putting these workshops together for 40 years. It's a tremendous accomplishment. The organization deserves to be recognized for the large impact that it has on pushing science and new developments forward.

Plamen Atannassov
UC Irvine

PHOTOVOLTAICS/SEMICONDUCTORS FOR RENEWABLE ENERGY SOLUTIONS

NATALIE STINGELIN
Professor, Chair of the School of Material Science, Georgia Tech


Georgia Tech

Photovoltaics (PV) are more commonly known as solar panels. They generate power by using semiconducting materials that absorb light energy and convert it into electrical energy. Developing new sustainable and affordable materials to better collect, generate, and transmit electricity from the sun is a key part of the global renewable energy generation strategy.[12]

Natalie's work focuses on gaining fundamental understanding of functional macromolecular materials ("functional" plastics) that underpin technologies targeted at achieving climate resilience and realizing accelerated decarbonization. Examples include novel, semi-transparent energy harvesting systems; smart windows that control light- and heat- flow; and envelope technologies that help to dramatically reduce the overall need for active cooling/heating in buildings, agricultural greenhouses, and electric vehicles, while enabling better daylight access.

Natalie co-organizes and attends the following Telluride Science workshops: The Role of Assembly in Dictating the Functionality and Applications of Organic Semiconductors, Polymer Physics, Hierarchical Assembly and Function of Organic and Hybrid Materials, and Organic Bioelectronics: Tackling the Mixed Conduction Challenge.

[12] https://www.energy.gov/eere/solar/photovoltaics

I cannot count all the Telluride meetings I have attended. They are unique across all the conferences and workshops that are out there. The reason is that Telluride Science provides a platform where scientists have time to mingle, have the freedom to discuss, feel comfortable to agree and disagree. Telluride attendees are given the time to think, and then advance new theories, approaches, and models. So many ideas, indeed new views, have resulted from the Telluride workshops that I have attended. Each time I returned to my job refreshed with new motivation, invigorated and ready to conquer the next science problem. That's why I try to return to Telluride once a year!

Natalie Stingelin
Georgia Tech

COMPUTING ENERGY CONSUMPTION

JIM CRUTCHFIELD
Distinguished Professor of Physics, University of California, Davis


UC Davis

Computer processing and cloud computing use a tremendous amount of energy, currently estimated to be roughly 2.5% of global greenhouse gas emissions, more than the aviation industry.[13] With the exponential increase in computing and data storage and processing, this energy demand is also expected to exponentially increase. Reducing the energy use for computing is critical to meeting our climate goals.

Jim has been attending Telluride workshops since 2014. His first experience in Telluride was so impactful that a year later, he organized a workshop called Information Engines, which led to an important rethinking of how systems use information and energy to support their function. This new thinking was leveraged and applied to the design of energy-efficient computer devices and logic gates (a building block of computation and information processing). The result – new logic gates that are 10,000x more energy efficient than current technologies. This will ultimately have a major impact on reducing the massive amounts of energy that computing consumes.

Jim co-organizes and attends the annual Telluride Science workshop, Information Engines at the Frontiers of Nanoscale Thermodynamics.

[13] https://www.climatiq.io/blog/measure-greenhouse-gas-emissions-carbon-data-centres-cloud-computing

The unique environment at Telluride Science allows scientists to see the larger picture and tackle big, cross-cutting problems. Dedicated to addressing today's complex problems and to stimulating the scientific and engineering breakthroughs needed for both progress and a sustainable future, the success of Telluride Science comes from nurturing a research atmosphere that encourages collaboration, teamwork, and open minds.

James Crutchfield
University of California, Davis