Type them into questions box!

“Why am I muted?”
Don’t worry. Everyone is muted except the presenter and host.
Thank you and enjoy the show.

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Learn how to write better abstracts, deliver more engaging presentations, and network to your next dream job. Brush up on your soft skills and set a new career path by mastering what can not be taught in the lab.

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The Drug Design Delivery Series has built a collection of the top minds in the field to explain the mechanics of drug discovery. Discover the latest research, receive an overview on different fields of study, and gain insight on how to possibly overcome your own roadblocks.

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Why does food taste better when it is grilled or what molecular compounds make a great wine? Discover the delectable science of your favorite food and drink and don't forget to come back for a second helping.

Popular Chemistry
Feeling burdened by all that molecular weight? Listen to experts expound on the amazing side of current hot science topics. Discover the chemistry of rockets, how viruses have affected human history, or the molecular breakdown of a hangover.

Business & Entrepreneurship
How do ideas make it from the lab to the real world? Discover the ins and outs of the chemical industry whether you are looking to start a business or desire a priceless industry-wide perspective.

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ACS Career Navigator: Your Home for Career Services

Whether you are just starting your journey, transitioning jobs, or looking to brush up or learn new skills, the ACS Career Navigator has the resources to point you in the right direction.

We have a collection of career resources to support you during this global pandemic:

- ACS Leadership Development System
- Career Navigator LIVE!
- ACS Webinars
- Virtual Classrooms
- College to Career
- Professional Education
- Virtual Career Consultants
- ChemIDP

Visit [www.ACS.org/COVID19-Network](http://www.ACS.org/COVID19-Network) to learn more!
Register Today for the ACS Virtual Career Day!

ACS Virtual Career Day
SATURDAY, NOVEMBER 21
11 AM ET

www.acs.org/careerevents

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Advancing ACS’s Core Value of Diversity, Inclusion & Respect

We believe in the strength of diversity in all its forms, because inclusion of and respect for diverse people, experiences, and ideas lead to superior solutions to world challenges and advances chemistry as a global, multidisciplinary science.

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Upcoming Broadcasts

LA QUÍMICA COMPUTACIONAL

MÁRTIROS, 18 de Noviembre de 14h 2:30pm ET
Presider: Juan José Álvarez-Velázquez, Universidad Nacional Autónoma de México
Moderador: Leon Rico-Aguilera, Sociedad Química de México

La Química del Aprendizaje

- How to become aware of why healthy competition is the way to a healthy work-life balance and job satisfaction
- Understanding the value of mentorship and open to reverse-mentoring
- How to discover ways to advance your career and performance beyond your comfort zone

Deprodukció.com. Sociedad Química de México y Chemson & Engineering Photo

- The ACS Webinar is produced for Spanish speaking target audience.

MITIGATING DRUG-INDUCED LIVER INJURY

Assessing Transporter Liabilities and Bioactivation Transcripts

Thursday, November 19, 2020 at 2:30pm ET
Speakers: Michael Hruby, Merck; Jim Shanos, Merck; Wenxin Yang, Merck
Moderator: Kevin Ake, Janseen Research & Development

What You Will Learn
- The role of hepatocytes in drug-induced liver injury and strategies to better increase with transporter inhibition activity
- Development of a bioactivation gene signature-based model in predicting hepatocellular and hepatic bioactivation in vitro and vivo applications in the direction of safe drugs
- Establishment of an in vitro transcriptional signature of bioactivation using a microarray-based circuit system (MIRCircuit) to detect compounds early in discovery

Co-sponsored with ACS Division of Chemical Toxicology, ACS Division of Medicinal Chemistry, American Association of Pharmaceutical Scientists, and ACS Publications

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Here Comes the Sun: Advances In Solar Power

November 17, 2020

Vijay Kapur
CEO (retired), International Solar Electric Technology
Here Comes the Sun: Advances in Solar Power

Vijay Kapur
CEO (retired), International Solar Electric Technology

Bill Tuszyński
Partner, The Unami Group LLC

Presentation slides are available now! Edited recordings are an exclusive ACS member benefit.

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Sustainability Challenges (similar to UN SDGs)

- Climate Change
- Access to Clean Water
- Eco-friendly Agriculture
- Zero Emission Transportation
- Access to Digital Information
- Education
- Economic Opportunities
- Health Care
- Affordable and Comfortable Habitats
  - Heating and Cooling
  - Cooking Facilities
- Poverty Eradication

Abundant and low-cost solar energy provides possible solutions to all of these challenges

Historic and Current Level of CO2 in the Atmosphere and the Impact of Climate Change

Major Climate Change Impacts
- More Frequent Extreme Weather Events
- Curtailed Fresh Water Resources (Melting of Glaciers)
- Rising Sea Levels
- Mass Migration of Climate Refugees

Oct.2020 CO2 Level 411 ppm
Cumulative CO2 in Atmosphere about 3200 Billion MT
Annual Increase in CO2 about 40 Billion MT
Urgent Actions Needed to Correct Climate Change

- Curtail Local Emissions of Greenhouse Gases and Establish Systems for CO2 Sequestration
- Minimize use of Fossil Fuels
- Promote Clean Public Transportation
- Replenish Lost Greenery by Planting Trees
- Sustainable Agriculture and Promote Vertical Farming

Maximize the Use Solar Energy

Solar Abundance

- Ubiquitous sunshine has sustained life on earth for billions of years
- The challenge we face now, is to use it wisely without polluting the Environment
**Solar Energy Spectrum**

→ AM0 = 1.37 KW/M2

→ AM1.5: = 1.0 KW/M2

**Available Solar Resource: Worldwide**
Available Solar Resource: USA

Harnessing Solar Energy
Photovoltaics (Direct Conversion of Sunlight to DC Electric Power)

Cross-Section & Semiconductor Band-gap vs. Solar Cell Conversion Efficiency

Types of PV Cells—Classified by Absorber Material

First Generation:
- Monocrystalline Si
- Polycrystalline Si
- III-V Compound semiconductors (GaAs)

Second Generation:
- Amorphous Si
- CIGS (CuInGaSe₂)
- CdTe
- Multi-junction

Third Generation:
- Perovskite
- Organic PV
- Dye-sensitized cells
- Quantum Dot
Processing Silicon into PV Cells & Modules

Multi-Junction “Rainbow Cell”
Advantages of Solar PV Systems

Advantages of Solar PV System

- It converts solar energy directly into electrical energy without going through thermal-mechanical link. It has no moving parts.
- Solar PV systems are reliable, modular, durable and generally maintenance free.
- These Systems are quiet, compatible with almost all environments, expected life span of 20 years or more.
- It can be located at the place of use and hence no distribution network is required.
Energy Storage

• **Batteries** — a range of electrochemical storage solutions, including advanced chemistry batteries, flow batteries, and capacitors

• **Thermal** — capturing heat and cold to create energy on demand or offset energy needs

• **Mechanical Storage** — other innovative technologies to harness kinetic or gravitational energy to store electricity

• **Hydrogen** — excess electricity generation can be converted into hydrogen via electrolysis and stored

• **Pumped Hydropower** — creating large-scale reservoirs of energy with water

Grid-connected & Battery-Backed PV Systems
Vertically mounted PV Systems

South and west facing vertically mounted PV systems, at locations of latitudes 40 N or higher, yield 60% of the max. output.

At 20 N the output is about 50%.

With very low PV system prices competing with the high price of land in big cities, the ROI of vertically mounted PV systems is quite attractive.

Flotovoltaics

- Water provides natural cooling of arrays and enhances their output
- Large PV systems placed on an ocean surface provide a convenient means of producing clean water via desalination
Agrivoltaics

Agrivoltaics is co-developing the same area of land for both solar photovoltaic power as well as for agriculture.

Benefits:

• Dual use of land
• Reduced electricity cost
• Diversification of revenue stream
• Control of wind and soil erosion
• Water saving
• Improved crop production

Remote Applications

Village Water Pumping

Power for Cellular Towers

LED Street Lights

Parking Meters

Trash Compactors
Global Energy Consumption

Primary energy consumption by world region
Primary energy consumption is measured in terawatt-hours (TWh). Note that this data includes only commercially traded fuels (coal, oil, gas), nuclear and modern renewables used in electricity production. As such, it does not include traditional biomass sources.

• World’s Daily Power Consumption: 15.8 TW

• US Daily power consumption: 3.35 TW

• Daily Incident Power on Planet Earth: 174,000 TW

1 Terawatt (TW) = 1 Trillion Watts

Energy Access

• **940 million** (13% of the world) do not have access to electricity.  
  [https://ourworldindata.org/energy-access#access-to-electricity](https://ourworldindata.org/energy-access#access-to-electricity)

• **3 billion** (40% of the world) do not have access to clean fuels for cooking.  
  This comes at a high health cost for indoor air pollution.  
  [https://ourworldindata.org/energy-access#access-to-clean-fuels-for-cooking](https://ourworldindata.org/energy-access#access-to-clean-fuels-for-cooking)

• Per capita electricity consumption varies more than 100-fold across the world.  
  [https://ourworldindata.org/energy-access#how-does-per-capita-electricity-consumption-vary-across-the-world](https://ourworldindata.org/energy-access#how-does-per-capita-electricity-consumption-vary-across-the-world)

• Per capita energy consumption varies more than 10-fold across the world.  
  [https://ourworldindata.org/energy-access#how-does-per-capita-energy-consumption-vary-across-the-world](https://ourworldindata.org/energy-access#how-does-per-capita-energy-consumption-vary-across-the-world)

• Energy access is strongly related to income: poorer households are more likely to lack access.  
  [https://ourworldindata.org/energy-access#low-income-households-lack-access-to-electricity-and-clean-fuels](https://ourworldindata.org/energy-access#low-income-households-lack-access-to-electricity-and-clean-fuels)
**HDI vs. Annual Electricity Consumption per Capita (KWh)**

Providing an affordable 0.5 to 1.0 KW PV system to people living in sunny countries, can improve the quality of their life significantly.

---

**Solar Powered Extraction of Potable Water from Air**

Very active field. A variety of different approaches have been developed.

Some require electric power while others work on a temperature gradient and choice of a number of efficient absorbers.
Solar Water and Space Heating

- Space heating can be done with fan coil heat exchanger or by radiant heat from the embedded hot water pipes in the floor.

Solar Cooking - Sun Oven and Go-Sun

- Cook, Bake, Dehydrate or Boil with the World's Most Universal Power Source... Free Sunshine!
- Reaches Temperatures of 360 to 400 Degrees Fahrenheit!
- Bake, Boil or Steam Foods — Boil or Pasteurize Water!
- The most energy-efficient way to re-hydrate freeze-dried emergency preparedness foods.
- Dehydrate Fruits, Vegetables or Jerky!
- Slow cook or cook in comparable time to conventional stove tops or ovens!
- Totally Safe — No Danger of Fire!
- As Portable as a Small Suitcase — Only 23 lbs!
- Ruggedly Built for Years of Trouble-Free Use!
- Everything you need to cook, dehydrate, bake and pasteurize water with the power of the sun.
Community Cooking with Solar Generated Steam

Solar Steam Cooking Facility at Mt Abu India

Cooks **20,000 Meals Daily** with little carbon foot print.

A number of other religious centers in India have established similar facilities and are preparing **> 30,000 meals a day**.
People can be trained in a short time to work on projects in solar energy.

Advanced college degree is not required for this training.

Focused and accelerated training programs can help reduce the poverty level.

Thank you for your interest and attention.

Materials and data used in this presentation has been drawn from the reports & websites of the following: DOE, NREL, EIA, IRENA, REN21, WIKI-SOLAR ORG, SEIA, FRAUNHOFER ISE AND OTHERS.
See you January 21, 2021

Fluid Movements: Interpreting the History, Present, and Future of Water

Jahnavi Phalkey
Founding Director, Science Gallery Bengaluru

Jesse Smith
Research Curator, Science History Institute

Here Comes the Sun: Advances in Solar Power

Vijay Kapur
CEO (retired), International Solar Electric Technology

Bill Tuszyński
Partner, The Unami Group LLC

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Upcoming Broadcasts

LA QUÍMICA COMPUTACIONAL en el Estudio de los Mecanismos de Reacciones. Radical-Molécula

Wednesday, December 2, 2020 at 2:30pm ET

Speakers: Néstor A. M. de la Higuera, Universidad Nacional de Colombia, and Néstor A. M. de la Higuera, Universidad Nationale de Colombia

What You Will Learn:
- The role of key concepts in drug-induced liver injury and strategies to better understand and manage
- The use of computational tools to predict selective toxicity
- The importance of understanding drug metabolism in drug development

Register for Event

MITIGATING DRUG-INDUCED LIVER INJURY

Thursday, November 19, 2020 at 2:30pm ET

Speakers: Michael Hudy, Merck; Jim McManus, Merck; and Akshat Mehta, Merck

What You Will Learn:
- The importance of understanding drug-induced liver injury and strategies to manage it
- The role of computational tools in predicting drug-induced liver injury
- The importance of understanding drug metabolism in drug development

Register for Event

STARTING A COMPANY: WHERE DO YOU GET FUNDING?

Tuesday, December 1, 2020 at 2:30pm ET

Speakers: Jim Snow, Tenagra, and Dr. C. Chang, 2020 ACS President-Elect, Medicinal Chemistry

What You Will Learn:
- The role of computational tools in predicting drug-induced liver injury and strategies to manage it
- The importance of understanding drug metabolism in drug development
- The role of computational tools in predicting drug-induced liver injury and strategies to manage it

Register for Event

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