

Division of Environmental Chemistry

Call for Papers

ACS Spring 2027

New Orleans, LA – March 21-25

Join us in New Orleans, LA to share your recent research and results with the Division of Environmental Chemistry at **ACS Spring 2027**. Submit abstracts for in-person oral or poster presentations at <https://maps.acs.org>. **Please note this is an in-person conference only - no digital content or remote access to programming.**

Several symposia are offered jointly with other ACS divisions; joint symposia are indicated in **BLUE**. Contact ENVR Spring Program Chairs if you would like to be part of the joint organization team.

Abstract Submission Deadline: September 28, 2026

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Honorary and Special Symposia

ACS Award for Creative Advances in Environmental Science and Technology

Organizers: Virender Sharma

Invited abstracts only. This annual ACS award encourages creativity in research and technology or methods of analysis to provide a scientific basis for informed environmental control decision-making processes or to provide practical technologies that will reduce health risk factors.

Symposium honoring **Prof. Ronald C. Cohen**, UC Berkeley, 2027 recipient of the ACS Award for Creative Advances in Environmental Science and Technology. Professor Cohen's research on atmospheric chemistry — a chemical perspective on the effects of human activity on the Earth's atmosphere and on exchanges between the atmosphere and biosphere — focuses on developing and applying new experimental and modeling strategies for understanding the chemical composition of the Earth's atmosphere now and in the past and for predicting future changes. Current research focuses on the role of nitrogen oxides and on the isotopes of water.

Electron Transfer Processes in Natural and Engineered Systems: Symposium in Honor of Professor David Waite

Organizers: Virender Sharma; Shikha Garg, UNSW Sydney

Invited abstracts only.

This symposium celebrates five decades of transformative contributions to environmental chemistry and engineering. From the fundamental chemistry of iron redox dynamics and associated reactive oxygen species generation in natural systems to the development of advanced membrane and electrochemical treatment technologies, Professor Waite's work has shaped both the fundamental science and practice of environmental problem-solving. Bringing together colleagues, collaborators, and former students from around the globe, this gathering is to honour a scientific legacy that continues to define the frontier of sustainable environmental science and technology.

ES&T Journals Award Session for James J. Morgan Early Career Lectureship

Cosponsored with ES&T Journals

Organizers: Maggie Mills, Vanessa Negron

Invited abstracts only. This symposium celebrates the winners of the 2027 James J. Morgan Early Career Award. The award recognizes early career researchers who are pursuing new ideas, persisting despite adversity, and pushing the environmental science and technology community in exciting directions. The symposium features oral presentations by the winners of the award alongside other invited speakers.

Tribute to Edward (Ed) Brush: Environmental Justice Education in the Classroom

Joint symposium with CHED

Organizers: Elizabeth Day; Monica Hensley; Laurel Royer; Sederra Ross; Amy Cannon; Loyd Bastin

This symposium explores how environmental justice (EJ) can be integrated into education to foster critical understanding of environmental and human health inequities and support transformative action. Presentations highlight research and pedagogical approaches that address environmental racism, product safety across demographics, climate vulnerability, and community-centered knowledge across K–16. Panelists share strategies for linking scientific, social, and ethical dimensions of environmental and human health issues through culturally sustaining and place-based approaches. The session advances a vision of EJ education that promotes equity, civic engagement, and meaningful participation in creating more just and sustainable futures.

Women in Science & Engineering (WISE): Tribute to Contributions Made to Environmental Chemistry (Invited)

Nominal sponsor: WCC

Organizers: Young-Shin Jun; Jessica Ray; Virender K. Sharma

Invited abstracts only. This annual Division of Environmental Chemistry award is presented to university graduate students who submit the highest quality research papers for consideration by the awards committee.

This symposium highlights advances and pioneering contributions by women in environmental chemistry, environmental engineering, and environmental policy. Presentations will celebrate and recognize important scientific discoveries, breakthrough technological advances, and emerging paradigms and policies advanced by both established and early-career scientists across transformative topics. In particular, the Women Chemists Committee (WCC) will celebrate its 100th anniversary in 2027, marking a century of leadership and impact in the chemical sciences. Please join us in celebrating these achievements.

Atmospheric Chemistry

Greenhouse Gases: Sources, Sinks, and Solutions

Joint symposium with GEOC

Organizer: Joe Sabol

Greenhouse gases are the primary drivers of ongoing climate change, with carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) contributing the majority of anthropogenic radiative forcing, but each has different decay dynamics. Methane is a much more potent greenhouse gas than carbon dioxide on a per-molecule basis and is responsible for roughly 20–30% of the recent increase in Earth's surface temperature. Its atmospheric concentration, now approaching 2 ppm, has risen sharply over the past century, tracking fossil fuel use. Nitrous oxide is even more potent than methane and its atmospheric concentration has risen to 0.34 ppm. Agriculture and manure management are the largest anthropogenic sources of nitrous oxide. Other potent, long-lived greenhouse gases include sulfur hexafluoride (SF₆), chlorofluorocarbons (CFCs), and hydrochlorofluorocarbons (HCFCs). The persistence of gases in the atmosphere is a complex function of time and depends on sources, sinks, decay mechanisms, and atmospheric lifetimes. This session brings together research and applied work on relevant atmospheric processes of greenhouse gases and mitigation. Topics include atmospheric measurements and modeling, characterization of sources and sinks, strategies to reduce emissions at their source, and market, policy, and regulatory elements. The session aligns with U.N. Sustainable Development Goals 7 (Affordable and Clean Energy) and 13 (Climate Action).

Organic Contaminants in Air and Their Impacts

Organizers: Adelaide Clark; Slawo Lomnicki

Organic contaminants in air, particularly SVOCs in particulate matter, have been studied for decades but still present a hazard to human and environmental health. Presenters are invited to share data on contaminants in a variety of locations and systems to help us better understand the impact of the air we breathe.

Biochemistry Applications

Bioprocesses for Environmental Applications: Leveraging Enzymes, Pathways, and Consortia from Remediation to Biomanufacturing

Joint symposium with GEOC

Organizers: Hunter Schroer; Yaochun Yu

Biotic systems leverage exquisite selectivity and highly tuned regulatory feedback loops to balance metabolic demands, environmental stressors, and chemical transformations. With the decreasing cost of genetic sequencing, advances in omics technologies, and rapid development of synthetic biology and metabolic engineering tools, we have entered a new era for discovering, understanding, and engineering biological systems to carry out desirable chemistry. This session will bring together researchers leveraging synthetic biology, metabolic engineering, enzyme discovery and engineering, and microbiome-based approaches to develop sustainable bioprocesses for environmental remediation, contaminant transformation, resource recovery, and green biomanufacturing. We invite contributions that use cultivation approaches, protein engineering, metabolic engineering, microbiome engineering, or synthetic biology to shape new biotransformation pathways for environmental applications. Topics of interest include, but are not limited to, enzymatic degradation or transformation of emerging contaminants; engineered consortia for remediation, resource recovery, and circular biomanufacturing; biological approaches for critical mineral separation and extraction; and green biological chemistry that replaces traditional processes with more sustainable alternatives. Together, this symposium will highlight a broad suite of biological tools that are shaping the future of environmental biotechnology and sustainable chemistry.

Energy and Geochemistry

Advanced X-Ray and Neutron Methods for Geochemical and Environmental Research

Joint symposium with GEOC

Organizers: Peng Yang; Si Athena Chen; Anna Wanhala

Addressing global challenges related to critical mineral supply, clean energy, water quality, carbon management, and environmental sustainability requires a deep understanding of complex geochemical processes across multiple length and time scales. X-ray and neutron-based characterization methods provide unprecedented opportunities to uncover the structure, chemistry, and dynamics of natural and engineered systems with high spatial and temporal resolution. This symposium invites contributions that apply scattering, spectroscopy, and imaging approaches to investigate fundamental and applied problems in geochemistry and environmental science. Topics of interest include, but are not limited to, mineral nucleation and growth, mineral–water and solid–fluid interfacial processes, contaminant transport and remediation, critical mineral extraction and recycling, carbon capture and sequestration, biomineralization, and sustainable resource recovery. Contributions may focus on crystalline, amorphous,

nanoscale, or heterogeneous materials, as well as dynamic processes under in situ or operando conditions. Studies integrating experimental measurements with modeling, simulation, data science, or machine learning approaches are encouraged. We welcome research using synchrotron, neutron, laboratory-scale, or multimodal characterization techniques that advance mechanistic understanding of environmentally relevant systems. By bringing together researchers across chemistry, geoscience, environmental engineering, and related disciplines, this symposium aims to foster interdisciplinary collaboration and highlight emerging tools and discoveries that are shaping the future of geochemical and environmental research.

Critical Minerals Including Rare Earth Elements: Occurrences, Sustainable Extraction, Separation, and Applications

Organizers: Chia Swei Hung; John Boeckl; Mallikarjuna Nadagouda; Sushil Kanel; Bishnu P Thapaliya

Critical minerals (CMs), including rare earth elements (REEs), are essential to modern technologies, enabling advancements in smartphones, electric vehicles, computing, optics, lasers, advanced ceramics, and renewable energy systems. As global demand continues to rise, ensuring a secure, sustainable, and resilient supply chain for these materials has become increasingly important. However, significant environmental and technical challenges associated with their extraction, processing, and purification remain major barriers to supply. This symposium will showcase innovative approaches for sustainable recovery, selective separation, and utilization of CMs and REEs from both conventional and unconventional resources. By integrating fundamental scientific discoveries with engineering solutions, the session aims to advance environmentally responsible technologies that reduce the ecological footprint of critical mineral production. The organizing committee is exploring opportunities to publish selected contributions from the symposium in a special issue of an ACS journal, such as Environmental Science & Technology Water or Environmental Science & Technology Engineering.

Carbon Innovation Energy Technology: Materials, Chemistry & Novel Processes

Organizers: Fan Shi

This symposium brings together research talent working to resolve major energy challenges, focused on ensuring affordable, abundant, and reliable energy. Topics include carbon innovation, CO₂ capture, mineralization and reliable CO₂ storage; novel materials, chemistry/mechanisms, and processes for energy innovation; techno-economic analysis (TEA) and systems analysis; and bench-scale testing and process integration.

Hydrogen in Internal Combustion Engines for Decarbonization of Freight and Commercial Vehicles

Organizers: Andre L. Boehman; Giorgios Karavalakis

Hydrogen as a fuel for internal combustion engines in freight and commercial vehicles can lead to dramatic reductions in carbon intensity and criteria pollutant emissions. This symposium will explore the production, transport, storage, and combustion challenges that represent barriers to the deployment of hydrogen in internal combustion engines for the freight and commercial vehicle sector. We encourage submissions addressing these themes.

Iron Redox Chemistry and Environmental Applications

Organizer: Virender Sharma

Convene leading chemists and environmental scientists to explore iron's fundamental redox mechanisms and its critical role in remediation, energy, biogeochemistry, and planetary ecosystems. The symposium of ten presentations will cover the following topics: Zero-valent iron (ZVI) in remediation. Fenton- and Fenton-like reactions in water treatment technologies and in liquid phase aerosols chemistry. Atmospheric iron and phytoplankton productivity. Role of iron in biogeochemical cycles. Iron in green energy transitions. High-valent iron species in depollution and disinfection.

Environmental Monitoring, Analytical Chemistry

Environmental Films at the Gas-Solid Interface: Formation, Succession, and Functional Consequences

Joint symposium with ANYL

Organizers: Scott Shaw; Dave Cwierntny

This symposium invites contributions reporting physical, chemical, or biological characterization of surface films in the natural or built environment. Topics of interest include field and laboratory characterization of film chemistry, physics, and microbiology; aerosol deposition and other atmospheric inputs; microbial community assembly and succession; bulk as well as spatially or temporally resolved analysis; and network or computational approaches for integrating multi-domain datasets. Environmental films also concentrate and transform contaminants of concern including heavy metals and persistent organic pollutants. Contributions addressing contaminant accumulation, transformation, and bioavailability within films are also welcome. Finally, we welcome submissions on consequences of environmental films, including health effects, material degradation, and strategies for designing surfaces that resist, tolerate, or exploit film formation.

Portable and Field-Deployable Platforms for Emerging Contaminant Detection in Food, Water, and Environmental Systems

Organizers: Yang Lin; Luyao Ma

This symposium will focus on portable, on-site, and field-deployable technologies for detecting and characterizing emerging contaminants in food, water, and environmental systems. Topics will include microplastics and nanoplastics, PFAS and other emerging contaminants, food and agricultural safety, sample preparation and enrichment, Raman/FTIR spectroscopy, SERS and other optical sensing methods, microfluidic and miniaturized analytical platforms, AI-assisted analysis, and bioassessment approaches. The symposium will bring together environmental chemists, analytical scientists, engineers, food safety researchers, and toxicologists to discuss approaches that connect laboratory measurements with real-world monitoring and decision-making.

Sensors for Water Quality Monitoring in Resource Limited Environments

Organizers: Eric Brack; Samuel Rowley-Neale

The focus of this symposium is to highlight novel and innovative technologies amenable for portable sensors to detect chemical and biological water contaminants in remote environments. Presentations may include summaries of existing sensor technologies and needs, novel detection systems, or innovative methods to address current research gaps. Possible chemical contaminants of interest include heavy metals, toxic industrial chemicals, pesticides/herbicides, perfluorinated carbons, and others not listed here. Possible biological contaminants of interest include bacterial and viral pathogens, parasites, toxins, and others not listed here. The symposium will showcase a diverse array of research topics within the theme for professionals actively working on sensing technologies and those wanting to acquire knowledge of the state of the art. The session will facilitate future collaborations to provide scientific solutions to address gaps in portable sensors for real-time water quality assessment.

Wastewater Surveillance for Environmental Health Monitoring

Organizers: Bikram Subedi; Ramesh Sapkota

The White House Office of the National Drug Control Policy recently released the 2026 National Drug Control Strategy, highlighting the importance of wastewater surveillance for monitoring substance use and emphasizing the role of artificial intelligence to identify and respond to emerging synthetic drug threats. Analysis of untreated wastewater provides a timely and effective means of assessing community health by evaluating population-level exposure to chemicals of concern. Several epidemiological applications of wastewater analysis are reported, including the surveillance of controlled substances, new psychoactive substances, persistent organic pollutants, emerging contaminants, and the spread and resistance of infectious diseases at the community level. Initial large-scale temporal and spatial wastewater surveillance of drugs by the European Monitoring Center for Drugs and Drug Addiction and the Australian Criminal Intelligence Commission has recently been extended to nationwide monitoring of the drugs and microbial in U.S. communities. Many environmental toxicology researchers have pivoted to WBE to support public health departments in their communities. This session encourages the submission of cutting-edge WBE studies focusing on the status of the development and validation of analytical methods capable of determining targeted and untargeted trace levels of drugs and other emerging contaminants in wastewater, the propagation of associated uncertainties with epidemiological estimation and interpretation, and the integration of WBE data with existing statistics from community-level measures.

Interdisciplinary Approaches to Environmental Challenges

Addressing Societal Needs Through Community-Informed Chemical Systems Design

Joint symposium with CELL and POLY; Nominal cosponsor: PHYS

Organizers: Raphael Moreira; Nathalie Lavoine; Jillian L Goldfarb; Thaiesha Wright

This symposium brings together researchers developing molecular, interfacial, and materials-based approaches to address societal challenges through responsible chemical systems. Contributions are invited across physical chemistry, catalysis, polymers, cellulose and bio-based materials, electrochemistry, photochemistry, sensing, and related fields that advance structure–property–function relationships and chemical performance under realistic operating conditions. Particular emphasis is placed on translating molecular-level understanding into scalable, deployable systems through the integration of mechanistic insight, systems-level design, and implementation strategies. The symposium also welcomes research that incorporates community-informed perspectives into the design, evaluation, and deployment of chemical technologies, particularly for applications involving environmental exposure, sustainability, health, and equitable access. By connecting fundamental discovery with real-world implementation, the symposium aims to foster interdisciplinary approaches that enable robust, effective, and societally responsive chemical and materials systems.

Environmental Indicators of Population Health: Emerging Tools and Approaches

Organizers: Erin Driver; Devin Bowes

Understanding the impacts of complex environmental challenges requires transdisciplinary perspectives, advanced analytical techniques, and innovative methodologies. One emerging area of interest is the use of environmental data at the population level to identify trends, characterize exposures, and uncover systemic drivers of health and disease. This symposium welcomes research utilizing novel environmental matrices and sampling technologies, advanced analytical approaches including multi-omics frameworks, predictive modeling, machine learning, and geospatial analyses. Contributions that integrate environmental measurements with health, exposure, or disease data are particularly encouraged. Researchers working across the broad domains of environmental health, GeoHealth, and planetary health are invited to contribute.

Legacy and Emerging Contaminants

Advances in PFAS Research: Degradation, Detection, Health Implications, and Alternatives

Organizers: Manoj Shukla; Manoj Kolel-Veetil; Mallikarjuna Nadagouda; Nancy Kelley-Loughnane

Per- and polyfluoroalkyl substances (PFAS) are manmade chemicals and have been widely used since their development in the 1940s. These synthetic compounds are resistant to degradation due to the presence of carbon-fluorine (C-F) bonds and are nicknamed as “forever chemicals.” PFAS have been also used in the military within aqueous film forming foams (AFFF) for fire training and emergency response purposes. It is estimated that around 110 million Americans find PFAS contamination in their drinking water supplies. Exposure to PFAS, including their short-chain cousins, has been linked to several health-related issues such as cancer, elevated cholesterol, and obesity in humans. The Environmental Protection Agency (EPA) finalized a critical rule to designate perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) as hazardous substances under CERCLA. Moreover, EPA also established an enforceable limit of presence of certain PFAS compounds in the drinking water. Various

traditional techniques have been attempted to degrade and remove PFAS from contaminated media. The incineration of PFAS with other wastes have potential to produce the active greenhouse gases. This symposium will discuss recent advances in research efforts on the degradation, destruction, detection, isolation, removal, and sensing of PFAS. Research on health implications of PFAS and fluorine free PFAS alternatives will also be discussed.

Contaminant Oxidation Chemistry

Organizers: Aleksandra Szczuka; Adam Simpson; Jacob King

Oxidative processes play a dual role in contaminant management as they simultaneously destroy legacy and emerging pollutants while generating transformation byproducts with incompletely characterized health effects. As oxidative treatment technologies are applied to increasingly complex matrices, including impaired drinking water sources, wastewaters, agricultural runoff, and in food processing systems, the chemistry governing contaminant fate and byproduct formation remains complex. This symposium will highlight recent advances in contaminant oxidation chemistry, with particular emphasis on the formation, fate, and toxicological significance of undercharacterized byproducts across diverse environmental and engineered systems. Contributions are invited from researchers working across water treatment, agricultural systems, and food processing, reflecting the cross-sector relevance of oxidative transformation chemistry and the shared analytical and mechanistic frameworks that unite these disciplines.

Environmental Contaminants: Transport, Fate, and Health Implications

Organizers: Carrie McDonough; Carsten Prasse; Zhenyu Tian; Matthew Newmeyer; Zachary Kralles

A wide range of synthetic and natural chemicals and chemical mixtures are released by human activity, including legacy chemicals that have long been recognized as harmful, and emerging chemicals of concern. Advances in analytical instrumentation, environmental monitoring, exposomics, and computational chemistry are paving the way towards a better understanding of the environmental implications and human health impacts of anthropogenic chemical releases. This symposium will showcase recent advances that contribute to our understanding of environmental contaminants, including the characterization of contaminant mixtures and structural determination of novel contaminants as well as exposure, toxicokinetics, and health impacts of these chemicals in humans and wildlife.

Microplastics and Nanoplastics in the Environment: Methods, Modeling, Fate, Toxicity, and Sustainable Solutions

Joint symposium with POLY, TOXI, COLL, and COMSCI

Organizers: Souhail Al-Abed; Amber Pete; John Pettibone; Christie Sayes; Sushil Kanel; Dylan Shields; Grover P. Miller; Mark Blenner; Jing Jin; Phillip Potter; Samantha McBride

This will be an all-inclusive session for research pertaining to micro- and nanoplastics. The key topics involved in this session will be involved in the development and implementation of methods for sampling, separation, identifying, and quantifying of micro- and nanoplastics. Additionally, other topics include

modeling, fate and transport studies, as well as biological studies on how micro- and nanoplastics affect human, aquatic, and terrestrial life.

PFAS at the Nexus of Plants, Water, and Soil: Detection, Fate, and Remediation in Agroecosystems

Organizers: Hamidreza Sharifan

Per- and polyfluoroalkyl substances (PFAS) represent one of the most pervasive and persistent environmental contaminants of our time, with agroecosystems serving as critical yet understudied nexus points where PFAS-laden biosolids, irrigation water, and atmospheric deposition converge to drive plant uptake, rhizosphere transformation, and soil accumulation. This symposium brings together researchers at the forefront of PFAS detection, fate and transport, and remediation to advance mechanistic understanding of PFAS behavior across the soil-plant-water continuum, with emphasis on emerging analytical tools, nano-enabled remediation strategies, and the biogeochemical processes governing PFAS mobility and bioavailability in agricultural environments. By convening experts across environmental chemistry, agrochemistry, and soil science, this session aims to catalyze cross-disciplinary dialogue on solutions-oriented frameworks from sensor development and phytoremediation to policy-relevant risk assessment that address the growing threat PFAS pose to agricultural sustainability, food system integrity, and ecosystem health.

PFAS Treatment: Pathways to Complete Defluorination

Organizers: Adeyemi Adeleye; Jinyong Liu; Cheng Gu

Per- and polyfluoroalkyl substances (PFAS) persist in the environment because their carbon-fluorine (C-F) bonds resist conventional treatment. Many technologies remove PFAS from water by transferring them to another phase or partially transforming them, but durable remediation requires cleaving C-F bonds and converting organofluorine to fluoride. This symposium focuses on complete defluorination as the benchmark for PFAS destruction. We convene researchers advancing destructive technologies, including, but not limited to, electrochemical and photoelectrochemical oxidation, advanced reduction, nonthermal plasma, hydrothermal, sonochemical, biological, and photocatalytic systems. We particularly welcome contributions that quantify defluorination efficiency, elucidate the mechanisms, and evaluate performance in complex matrices and concentrated waste streams such as ion-exchange brines, membrane concentrates, foam-fractionation concentrates, and aqueous film-forming foam. This session aims to clarify which pathways are promising for complete PFAS mineralization and to chart the route from bench discovery to scalable application.

Technology and Engineering in Environmental Chemistry

From Waste to Resource: Technologies and Systems for Recovering Nutrients and Critical Materials

Organizers: Lei Guo; Young-Shin Jun

The increasing demand for nutrients and critical minerals and materials (CMMs) is placing unprecedented pressure on natural resources and global supply chains. At the same time, municipal, industrial, and agricultural waste streams represent largely untapped reservoirs of these valuable resources. Converting waste into resources not only mitigates environmental impacts but also creates new opportunities for sustainable materials management and circular resource use. This symposium will highlight emerging technologies and system-level strategies for recovering nutrients, critical minerals, and value-added materials from diverse waste streams. Emphasis will be placed on novel treatment strategies grounded in fundamental chemical principles, while also extending to approaches that are scalable, economically viable, and compatible with existing infrastructure, bridging foundational and applied science. We welcome contributions addressing: innovative separation and purification technologies; hybrid systems enabling simultaneous contaminant removal and resource recovery; field-deployable and decentralized recovery approaches; economic, regulatory, and implementation challenges; industrial case studies and pilot-scale demonstrations; life cycle assessment (LCA); and pathways to commercialization and market adoption.

Environmental Implications and Applications of Artificial Intelligence and Machine Learning

Joint symposium with GEOC

Organizers: Indranil Chowdhury; Nirupam Aich; Stetson Rowles

The rapid advancement of artificial intelligence (AI) and machine learning (ML) has opened new frontiers in environmental science and engineering, offering transformative tools to address critical challenges in pollution control, resource management, and environmental sustainability. AI/ML technologies provide innovative avenues to tackle complex environmental problems with high chemical specificity and spatial-temporal precision, spanning contaminant transport and chemical transformation pathways, optimizing water/wastewater treatment processes, enabling resource recovery, and enhancing environmental monitoring systems. Conversely, the environmental footprint of large-scale AI/ML infrastructure—including high energy demands, water use in data centers, and material intensity of hardware—raises important questions about sustainability and lifecycle impacts. A growing need has emerged for responsible development and deployment of AI/ML systems that consider their own environmental (chemistry-related) consequences, including emissions, waste streams, and interactions with air, water, and soil systems. This symposium welcomes research papers that describe recent advances in the context of environmental implications and applications of AI/ML. Topics of interest include, but are not limited to: 1) AI/ML models for predicting and mitigating chemical pollution in water, air, and soil; 2) Smart sensing and monitoring of environmental contaminants using AI/ML; 3) Machine learning-guided optimization of water treatment and resource recovery processes; 4) AI-enabled strategies for environmental remediation and chemical risk assessment; 5) Integration of AI/ML with chemical fate and transport models; 6) Impacts of AI/ML infrastructure on water quality and availability; 7) Energy, chemical, and material flows in data centers and computation-heavy AI/ML models; 8) Life cycle assessment (LCA) and sustainability for AI/ML systems; and 9) Chemical footprints of AI-related supply chains and waste streams.

Water Chemistry Technologies

Aquatic Photochemistry

Organizers: Kristopher McNeill; William Arnold; Garrett McKay; Juliana Laszakovits

Aquatic photochemical transformations are important in diverse contexts, from natural systems where sunlight is acting on surface waters to engineered systems using UV irradiation. Light may act directly upon target compounds or indirectly through interactions with redox-active species including minerals, dissolved organic matter, and small molecule sensitizers. Understanding the roles of photochemistry in these complex systems provides insight into the fate of chemical and biological species in the environment. In this symposium, we invite submissions that explore the direct and indirect photochemical transformations of natural and anthropogenic compounds, as well as interactions of light with organic matter, biomolecules, redox-active minerals, and microorganisms.

Electrified Water Treatment Processes

Organizers: Neha Sharma; Shiqiang (Nick) Zou; Mohan Qin; Wensi Chen

Most existing water treatment processes highly rely on the use of chemicals, such as coagulants, oxidants, and disinfectants. The transportation and storage of these chemicals can jeopardize the resilience of centralized water treatment and create intrinsic challenges for distributed water treatment. Recent attention has been drawn to treatment processes that mainly consume electricity instead of chemicals. These processes use electricity to drive separation processes (e.g., electrodialysis), provide direct redox power (e.g., electrochemical redox processes), or generate chemicals in situ (e.g., electrocoagulation, electrochemical acid/base production). Compared to chemical inputs, electricity is easier to deliver, can be generated locally upon grid disruption, and can be produced using sustainable energy for remote applications. As energy cost decreases and the treatment needs evolve (e.g., more stringent standards, zero-liquid discharge, and resource recovery), previously cost-prohibitive electrified processes may become economically favorable. In the meantime, new high-performance and energy-efficient electrified treatment processes are emerging. We invite abstract submissions on relevant technical areas of electrified water treatment processes, including electrocoagulation, electrochemical redox processes, electrodialysis, electrified membranes, electrosorption and capacitive deionization, electrochemical or electrophysical water disinfection, electric-field assisted processes, and electrochemical resource recovery. Abstracts on the techno-economic analysis (TEA) and life cycle assessment (LCA) of electrified water treatment processes are also welcome.

Nanotechnology in Water and Wastewater Treatment: Advanced Materials for a Sustainable Future

Organizers: Dr. Sushil Kanel; Dr. Mallikarjuna Nadagouda; Dr. Sudip Chakraborty; Dr Evrim Celik Madenli; Dr. Ichiro Imae; Dr. Sajan Silwal

Ensuring access to safe and sustainable water supplies has become increasingly challenging due to rapid population growth, rising water consumption, degradation of freshwater resources, climate variability, the

proliferation of emerging contaminants, and more stringent regulatory requirements. These pressures are exposing the limitations of conventional water and wastewater treatment technologies and highlighting the need for innovative approaches that can improve treatment efficiency, resilience, and affordability. Nanotechnology has emerged as a promising platform for addressing many of these challenges. The unique physical, chemical, and biological properties of nanomaterials have enabled the development of advanced treatment processes with enhanced performance in contaminant removal, separation, disinfection, and monitoring. Applications ranging from high-performance membranes and adsorbents to photocatalytic materials and nanosensors are opening new pathways to improve water quality and resource recovery while reducing energy and operational demands. This symposium aims to bring together researchers, practitioners, and industry professionals to discuss recent advances and future directions in the use of nanotechnology for water and wastewater treatment. Topics of interest include: 1. Advanced nanomaterials for adsorption and contaminant removal, including the design, synthesis, characterization, performance evaluation, and regeneration of nano-enabled adsorbents. 2. Nano-engineered membrane technologies, such as nanocomposite and nanofiber membranes that improve permeability, contaminant selectivity, fouling resistance, and process sustainability. 3. Lifecycle assessment, environmental safety, and sustainability of nano-enabled technologies, focusing on nanomaterials of less than 100nm size. 4. Nanotechnology-enabled disinfection strategies, including bioactive nanomaterials and antimicrobial systems for pathogen inactivation and microbial management. 5. Photocatalytic nanomaterials for water purification, focusing on the development and optimization of nanoparticles and nanostructured materials for contaminant degradation and environmental remediation. 6. Nanoscale sensing and monitoring technologies, including sensors for rapid and sensitive detection of pathogens, heavy metals, nutrients, and emerging contaminants in water systems.

Stormwater Runoff: Sources, Impacts, and Innovative Solutions for Treatment and Use

Organizers: Danhui Xin; Allen P. Davis; Zhenyu Tian

Stormwater runoff is a complex and highly variable mixture of contaminants originating from diverse land uses. While sources and impacts have been characterized for many traditional pollutants — such as metals, nutrients, and PAHs — from established land use categories, the landscape of stormwater management is being reshaped by emerging contaminants (e.g., PFAS, 6PPD-quinone, and microplastics) and contaminants associated with changing landscapes (e.g., data centers, electric and autonomous vehicles). Meeting these evolving challenges requires advances across multiple fronts. In analytical chemistry, non-target analysis, source tracking techniques, and novel sensor development are improving our ability to identify contaminant sources, characterize stormwater mixtures, and evaluate environmental pathways. In parallel, new toxicological and risk assessment frameworks provide deeper insight into the ecological and human health implications of stormwater contaminants. Emerging technologies can be integrated into stormwater control measures (SCMs) to improve performance against traditional contaminants while also addressing emerging concerns. Sustainable solutions will focus on stormwater treatment but also fates of accumulated chemicals in SCMs. This symposium will bring together chemists, toxicologists, biologists, and environmental and stormwater engineers to discuss recent advances in stormwater characterization, impact assessment, treatment technologies, and beneficial use applications. Topics will span both traditional and emerging contaminants, source-to-impact investigations, innovative monitoring, treatment and reuse strategies, and the implications of changing environmental conditions on stormwater management.

Interfacial Structure and Reactivity in Mineral-Water Systems: From Single-Crystal Surfaces to Porous Media

Organizers: Tuan Anh Ho; Sang Soo Lee; Ying Wang; Yihang Yuan

Mineral-water interfaces are critical sites for chemical reactions and processes in natural systems, including energy production, critical element recovery, contaminant transport, and changes in porosity and permeability in porous media. A molecular-scale understanding of interfacial structures and reactivities is essential for better understanding, controlling, and predicting these processes. This session will focus on recent experimental and computational research on structure and reactivity at mineral-water interfaces, covering a range of geochemical systems from ideal single-crystal surfaces to complex nanoparticles and porous media. Topics of interest include, but are not limited to, (1) characterization of surface structure and chemistry; (2) adsorption/desorption thermodynamics and kinetics; (3) surface-mediated redox reactions; (4) reactive transport and the multiscale nature of interfaces in porous media; and (5) geochemical interfaces in extreme environments. We invite contributions from a broad range of scientific disciplines that highlight advances in experimental, computational, and theoretical approaches to enhance our understanding of mineral-water interfaces over a wide range of temporal and spatial scales.

General Environmental Chemistry

General Environmental Chemistry - Posters

Organizers: Slawo Lomnicki; Bikram Subedi

Poster presentations are welcomed on recent research, technological advances, education, and policy that advance our understanding of environmental chemistry and engineering, on topics not covered in other ENVR symposia.