2022 Spring ACS Meeting
March 20-24, San Diego, CA
Bonding Through Chemistry

Geochemistry Division Call for Papers

Abstract submission: August 9, 2021 – October 11, 2021

Meeting format: Both in-person and virtual sessions

General information about the conference can be found at:
https://www.acs.org/content/acs/en/meetings.html

You are invited to submit abstracts for the following GEOC symposia*:

- Mineral-water interactions over multiple scales – connection between laboratory and field scale observations
- Undergraduate research in geochemistry
- Adsorption of environmental contaminants at aqueous interfaces
- Constraining the internal constitution of the earth with condensed matter geochemistry
- Reactivity of nanoconfined environmental interfaces
- Transport, fate and remediation of emerging contaminants in freshwater environments: implications for aqueous and terrestrial environmental health
- Microbially-driven geochemical reactions: kinetics and communities
- The ties that bond: A tribute to the science and legacy of John Zachara
- Microbial and chemical transformation of environmental contaminants and their engineered applications for remediation
- Microfluidics and the confined mineral-water interface
- Trace metal(loid) bioaccessibility and bioavailability: current approaches, persistent challenges
- Contaminant cycling in natural and built environments within urban and industrial areas
- Geochemistry in extreme environments
- General geochemistry

*organizer contact information and symposium descriptions are attached.

Abstract submission: Please submit your abstracts using the ACS Meeting Abstracts Programming System (MAPS) at http://maps.acs.org. The abstract submission window is August 9, 2021 – October 11, 2021.

Questions?

- For questions about specific symposia, please contact the organizers directly.
- For general inquiries about the Geochemistry Division symposia and activities, please contact Adam Wallace (afw@udel.edu).

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Mineral-Water Interactions Over Multiple Scales – Connection Between Laboratory and Field Scale Observations

Solid-water interfaces are ubiquitous in both natural environments and engineered systems. Interfacial processes at the nanoscale (e.g., ion adsorption/desorption and mineral growth/dissolution) are closely related to macroscopic and field-scale phenomena (e.g., rock weathering, fracturing, metasomatism and fluid flow in porous media), hence emphasizing the importance of a multi-scale understanding of key geochemical processes in aqueous solutions, at mineral-water interfaces, and within geological media. We encourage contributions from a broad range of scientific disciplines that highlight advances in experimental, computational, and theoretical designs to bridge observations ranging over multiple tempo-spatial scales.

The topics of interest in this session include, but are not limited to:

- New computational/experimental approaches to study mineral-water interfaces
- Structure and reactivity of mineral surfaces
- Adsorption/desorption rates and mechanisms
- Surface mediated redox reactions of environmentally relevant nanoparticles
- Multi-scale nature of mineral-water/rock-water interfaces
- Multi-scale modeling of reaction rates on solid-fluid interfaces and confinement
- Investigation of water-rock interactions in the critical zone

Experimental, modeling, and field investigations are welcome, as well as research into new computational and experimental techniques allowing for understanding mineral-water interactions over a wide range of tempo-spatial scales.

Inquiries should be directed to the symposium organizers:

Ke Yuan	**Juliane Weber**	**Sang Soo Lee**	**Xin Gu**
Oak Ridge National Laboratory, email: yuank@ornl.gov	Oak Ridge National Laboratory, email: weberj@ornl.gov	Argonne National Laboratory, email: sslee@anl.gov	Penn State University, email: xug102@psu.edu

Undergraduate Research in Geochemistry

This session will highlight research projects in geochemistry from undergraduate students, including those who have recently graduated. This session is intended to provide recognition to undergraduate students in geochemistry, encourage networking, identify opportunities for graduate research, and to help develop the careers of future chemists. A keynote lecture in geochemistry and a discussion of graduate school opportunities will be included. Students are also encouraged to attend the divisional mixer for additional networking opportunities.

Inquiries should be directed to the symposium organizers:

Jacquelyn Bracco
CUNY Queens College, email: jbracco@qc.cuny.edu

Adsorption of Environmental Contaminants at Aqueous Interfaces

This session will examine the affinity of contaminants (both organic and inorganic) at the variety of aqueous interfaces that exist in environmental systems, including interfaces between water and minerals, air, and biological surfaces. Presentations that use nanoscale experimental and/or computational techniques to gain insight adsorption at macroscopic scales are particularly encouraged.

Inquiries should be directed to the symposium organizers:

Ian Bourg	**Jasquelin Peña**
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Constraining the Internal Constitution of the Earth with Condensed Matter Geochemistry

Observation and interpretation of the Earth interior hinges on the nature of its condensed matter. The Rayleigh-Bénard convection cells with their near zero fluidity at the bottom of the mantle and supposed 2-3 complete turnovers during the earth's existence, the only slight variation in spin orientation during this massive mass transfer, the invariance of the mantle layering, the hotspot fixed coordination system for absolute plate motion, the graininess of the core mantle MgO-SiO2 slag-FeNi fluid metal like interface due to capillary rise and its S-wave ellipsometry, the anisotropic morphology of the solid core due to variable interfacial tension triggered by inhomogeneous sulfur distribution as surfactant in the FeNiS system and oriental consequences for the geodynamo, the surprisingly low resolution of seismic waves unable to distinguish migmatization or partial melting, the "quantized" nature of tectonic motion, and the role of grainsize on sound wave propagation and thermal conductivity, are among disconnected observables in need of unification with condensed matter notions. This symposium is a clarion call for a cohesive narrative between them requiring participation of observers (seismologists, paleomagnetists) interpreters (geodynamicists, theoretical geophysicists, thermodynamicists and tectonophysicist) and a broad swath of materials experts as constrainers (geochemists, petrologists structural geologists, rock/mineral physicists, metallurgists, aluminosilicate chemists, and glass (ceramics) scientists). It will be held in honor of Bill Fyfe and Ernie Ehlers. Their seminal books on the geochemistry of solids (1964, Fyfe) and the interpretation of geological phase diagrams (1972, Ehlers) set the stage.

Inquiries should be directed to the symposium organizers:

Bernard de Jong
Los Alamos, NM, email: bhwsdj@gmail.com

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Reactivity of Nanoconfined Environmental Interfaces

Nanoconfined solid-water interfaces are abundant in soils, sedimentary rocks, and the atmosphere. Examples of nanoconfined environments include water-filled nanopores, grain boundaries, interlayers of clay minerals, and nano-scale H_2O films. Energetics and reaction pathways in nanoconfined domains are non-trivial and distinct from bulk water. Nanoconfinement effects are critical to energy generation, carbon storage, nuclear waste disposal, and climate modeling; however, detailed fundamental explanations for the unique reactivity of nanoconfined solid-water interfaces remain elusive.

Nanoconfinement defines the chemical and physical properties of solid-water interfaces, leading to unexpected deviations in thermodynamics and reactivity. Nanoconfined systems are characterized by high surface-to-water ratios, overlapping electrical double layers from opposing surfaces, and sometimes by interfacial terminations that include gasses or supercritical fluids. Water under nanoconfinement is highly ordered and rotationally restricted due to interactions with solid surfaces, leading to relatively small dielectric permittivities and changes in mass transport. Because of these and other distinct properties of nanoconfined H_2O, interfacial chemistry under nanoconfinement cannot be predicted based on known bulk-system thermodynamics and kinetics.

We invite contributions on mineral-water interfacial chemistry under nanoconfinement. A mechanistic and conceptual understanding of the key factors controlling reactivity in confined aqueous solutions requires an integrated approach, and both experimental, theoretical, and computational studies are encouraged. The topics to be covered in this session include, but are not limited to:

- properties of water under nanoconfinement
- interfacial reactivity at nanoconfined surfaces and in pores
- mass transport in nanopores and nano-scale water films
- nanoconfinement effects on electron transfer
- nanoconfinement phenomena that can be traced to the field-scale
- dissolution, nucleation, and growth under nanoconfinement
- nanoconfinement effects on thermodynamics and kinetics
- novel experimental and computational methods for studying nanoconfined interfaces

Inquiries should be directed to the symposium organizers:

Anastasia G. Ilgen	**Nadine Kabengi**	**John Loring**	**Sophie Le Caër**
Sandia National Labs, email: agilgen@sandia.gov	Georgia State University, email: kabengi@gsu.edu	Pacific Northwest National Lab, email: John.Loring@pnnl.gov	Université Paris-Saclay, email: sophie.le-caer@cea.fr

Transport, Fate and Remediation of Emerging Contaminants in Freshwater Environments: Implications for Aqueous and Terrestrial Environmental Health

This symposium aims to address the issues of emerging contaminants in freshwater environments. Microplastics, one group of emerging contaminants, are of concern. As well as the intrinsic concern they pose, they are also a pollutant vector that adsorbs other pollutants with implications for environmental health. Additionally, they adsorb organic carbon which has implications for carbon sequestration and global warming. We propose to foster a conversation between scientists from a variety of disciplines, including those engaged in both computational and experimental approaches, who study these and other emerging contaminants and their effect on the carbon cycle.

Inquiries should be directed to the symposium organizers:

Lisa Emili	**Lorena Tribe**
Penn State Altoona, email: lae18@psu.edu	Penn State BerksUniversity, email: lut1@psu.edu

Microbially-Driven Geochemical Reactions: Kinetics and Communities

Microbes catalyze crucial reactions involved in global elemental cycles and ecosystem health, and promote processes that facilitate the bioremediation of contaminated soil and water. In this session, we will explore the diversity of ways that microorganisms control the rates, pathways, and products of chemical transformations in the environment. We invite submissions that promote discoveries at the intersection of microbial community ecology and biogeochemistry. We seek submissions that focus on both natural and engineered systems, in freshwater, marine, and terrestrial settings. Topics of interest will be broadly organized around key elemental cycles, especially those that focus on the geomicrobiology of carbon, oxygen, nitrogen, silica, phosphorus, sulfur, and metal(loid)s including aluminum, arsenic, iron, and manganese.

Inquiries should be directed to the symposium organizers:

William Burgos	**Jennifer Macalady**	**Wil Leavitt**	**Clara Chan**
Penn State University, email: wdb3@psu.edu	Penn State University, email: jlm80@psu.edu	Dartmouth College, email: William.D.Leavitt@dartmouth.edu	University of Delaware, email: cschan@udel.edu

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The Ties that Bond: A Tribute to the Science and Legacy of John Zachara

John Zachara, a retired Battelle Fellow at Pacific Northwest National Laboratory (PNNL), and recipient of the E.O. Lawrence Award from the U.S. Department of Energy, passed away in June 2021 after a two year battle with a rare form of bone marrow cancer. Zachara's research focused on chemical interactions of metals and radionuclides with mineral surfaces and microorganisms that control the rate at which these contaminants move through soils, sediments and groundwater. His later work delved into the complex interactions between hydrological flow and biogeochemical element fluxes in river corridor systems. This symposium will highlight the geochemical and hydro-biogeochemical discoveries and accomplishments of John Zachara through the lens of people he worked with and alongside during his 37-year career at PNNL. Zachara's work involved an extremely wide range of scientific problems and phenomena, including mineral-water interface structure and reactivity, interactions of organic contaminants and humics with minerals, mineral formation and dissolution, microbially-driven geochemical reactions both in bulk and at mineral surfaces (including pioneering advances in the mechanisms of electron transfer between bacteria and insoluble Fe-bearing minerals), and larger-scale problems of the fate and transport of environmental contaminants in hydrodynamic subsurface systems. The session welcomes submissions across this range of topics, from both (1) long-term colleagues who can provide a semi-historical perspective on the impact of Zachara's work and ways of thinking on their work and career, and (2) new/current findings by scientists of any age whose content and impact would have been of interest to John and which advance lines of inquiry related to his seminal work in geochemistry. We emphasize that contributions do not have to be limited to soil and subsurface systems; any chemical or biogeochemical processes that involve mineral surface interactions and transformations, etc. (e.g. including processes in the water column of aquatic systems) are fair game.

Inquiries should be directed to the symposium organizers:

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Nancy Hess	**Kenneth Kemner**	**Edward O'Loughlin**
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Microbial and Chemical Transformation of Environmental Contaminants and Their Engineered Applications for Remediation

The contamination of ecosystem with numerous organic and/or inorganic pollutants is a global issue which is a massive burden on resources of industries and governments alike. The transport and transformation of these pollutants are highly influenced by natural processes that are either chemical or microbial. Understanding the complex interactions of these chemical and microbial processes assist in designing and optimizing the remediation tactics and therefore, improve science-based decision making for site management, priority-setting, and treatment selection. This session is aimed to gather the experts who are addressing recent advances in microbial and chemical processes affecting the fate, transport, and remediation of organic and inorganic subsurface pollutants. The session invites the experimental, modeling, and remedial contributions to understand microbial metabolism, chemical processes, and transport of pollutant in the natural systems, although we do not put a limit only to natural environment. The research contributions describing the role of mixed microbial communities in biotransformation and their mechanism of pollutant detoxification are invited. State-of-the-art applications to quantify and improve remediation performance or develop preventive measures are welcomed. We also encourage the submissions that address the emerging applications of nanotechnology for environmental pollution prevention, contaminant treatment, and hazardous waste site cleanup.

The topics that would be covered in this session are, but are not limited to:

- Understanding the microbial and chemical interactions with the inorganic and organic contaminants in environment, and their influential role in remediation
- The *in-situ* and *ex-situ* remediation for decontamination of metals and organic contaminants at the contaminated sites including soil and water phases.
- Biogeochemical interactions of organic contaminants in natural environment.
- Interactions of geochemically important elements/contaminants (C, N, Fe, Mn, Hg, U, As and S)
- Application of these processes to develop remedial technologies for decontamination of inorganic and organic contaminants at the contaminated sites.
- Emerging molecular techniques for identification of microbial processes, interactions, and their networks in geogenic processes.
- Microbial communities, their role and mechanism of contaminant biotransformation in soil, water.
- Nanobased materials, such as nanoadsorbents, nanometals, nanomembranes, and photocatalysts for pollutant cleanup

Inquiries should be directed to the symposium organizers:

Byong-Hun Jeon	**Mayur B. Kurade**	**Enhyea Chung**
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Microfluidics and the Confined Mineral-Water Interface

This symposium welcomes contributions from those investigating reactivity of confined fluids at the mineral-water interface by using innovative experimental, theoretical, and micro/nano-analytical tools. Of special interest are applications of micro/nano-fluidics techniques for in operando studies at the mineral-water interface; high resolution reactive transport and molecular simulations of multiphase interfacial systems; high resolution interfacial and pore volume characterization by micro/nano-scale probes (e.g., synchrotron X-ray and neutron spectroscopy and scattering, scanning force microscopy, electron microscopy, vibrational spectroscopy).

Inquiries should be directed to the symposium organizers:

Bektur Abdilla	**YoungJae Kim**	**Sang Soo Lee**	**Paul Fenter**
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Neil C. Sturchio
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Trace Metal(loid) Bioaccessibility and Bioavailability: Current Approaches, Persistent Challenges

The release of metal(loid)s from geological media such as contaminated soils, mine tailings, and airborne particulate matter, including from combustion byproducts, into physiological systems represents a wide range of potential geochemical reactions including metal(loid) dissolution, precipitation, sorption, and desorption. Effectively characterizing the bioaccessibility and bioavailability of metal(loid)s similarly raises a wide range of challenges, including accurately simulating physiological systems in the lab, correlating in vitro bioaccessibility and in vivo bioavailability experiments, and applying experimental results to predict potential toxicity and health effects. This symposium invites submissions addressing current multi-disciplinary approaches to exploring trace metal(loid) bioaccessibility and bioavailability in the environment.

Inquiries should be directed to the symposium organizers:

Chris Kim	**Michael Kleinman**
Chapman University, email: cskim@chapman.edu	UC Irvine, email: mtkleinm@uci.edu

Contaminant Cycling in Natural and Built Environments within Urban and Industrial Areas

Within urban and industrial areas, we seek to highlight contaminant cycles in natural as well as built environments, and critically, movement between the two. This session welcomes contributions focused on the cycling of organic and inorganic (metal/metalloid) pollutants in soil, water, and air within urban settings and industrial complexes. Lifecycle work could include tracking contaminants from source to sink, partial or complete mass balances, degradation, fate and transport studies, and/or redox work. Studies should contain a field-based component and/or be strongly site-based. Work focusing on urban and rural brownfields, energy complexes, and mining-affected landscapes is of interest, as well as other marginalized or degraded land at the intersection of human-natural systems.

Inquiries should be directed to the symposium organizers:

Sarick Matzen	**Brandy Stewart**	**Cara Santelli**
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Geochemistry in Extreme Environments

In extreme environments, such as those that are under water-limited, alkaline, acidic, or hypersaline conditions, geochemical processes can be controlled by the ways in which ions compete for limited waters of solvation. In this regime, predicting saturation states and processes such as nucleation and crystal growth is profoundly different than under dilute conditions because formation of ion pairs or clusters becomes important. Traditional geochemical models are of limited use in these systems, particularly at high-pressure or high-temperature conditions. Other complicating aspects of extreme environments include ionizing radiation, such as in nuclear wastes, which can promote new reaction pathways and phenomena via metastable intermediates. This symposium is motivated by the need to assess the state-of-science in understanding the key fundamental processes that dictate reaction outcomes in these extreme environments, and to consolidate observations related to mineral transformations into common underlying principles. Contributions are invited that employ either experimental or computational approaches to probe the complex ion-water interactions that control chemistry across the diversity of extreme environments that can be found in geochemical and closely related industrial systems.

Inquiries should be directed to the symposium organizers:

Emily Nienhuis	**Ben Legg**	**Kevin Rosso**
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