Deep Planet Chemistry: Novel Phases and Reaction Pathways in Planetary Interiors

1 Abstract

The diversity of chemistry on the Earth's surfaces are key to the evolution and sustenance of life on Earth. This chemical diversity is related to dynamic nature of our planet and its ability to recycle essential elements for life between the surface and the interior. Planetary interiors including the depths of Earth host extreme pressure–temperature conditions that drive materials into unexpected chemical and physical regimes, yielding new phases, chemical bonding, crystalline structures, and transport properties typically unobserved at surface conditions. Understanding these processes is central to deciphering planetary evolution, magnetic field generation, and habitability.

This symposium invites contributions that advance fundamental insight into high pressure geochemistry and mineral physics through experiment, theory, or data-driven modeling. Topics of interest include but are not limited to: high pressure and temperature mineral chemistry and crystallization pathways; nucleation mechanisms under compression; electrical, thermal, and mass transport properties at extreme states; plastic, superionic and metallic phases; and high pressure properties of metals, silicates and volatiles; with investigation methods including static, dynamic, and ramp compression experiments, *ab initio* and machine-learning simulations. We particularly encourage research bridging geoscience, physical chemistry, computational chemistry, high pressure in situ measurements, materials science, and planetary science based studies relevant to both Solar System bodies and exoplanets. Contributions from students and early-career researchers are highly welcomed, and interdisciplinary perspectives are encouraged.

2 Important Links and Dates

- **Abstract Submission**: https://callforabstracts.acs.org/acsfall2026/GEOC
- **Abstract deadline**: March 30, 2026

3 Conveners

Maitrayee Ghosh, Stanford University & SLAC National Accelerator Laboratory
Suraj Bajgain, The Water School, Florida Gulf Coast University
Kyla de Villa, University of California, Berkeley
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