**Session Proposal**

# Session Title

Physicochemical and Biological Processes of Chemicals in Soils

# Session Organizers

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# Session Description

This symposium will focus on the complex interplay of physicochemical and biological processes governing the behavior, fate, and impacts of soil-receiving chemicals, including fertilizers, pesticides, inorganic and organic pollutants, residues (e.g., biochars, manure, biosolids, plastic films, toxins). Soils act as dynamic reactors where chemicals interact with soil matrices, microbiota, and environmental changes (e.g., fires, climate resilience). These interactions critically influence chemical bioavailability, transformation, transport, and long-term ecological risks. Despite their importance, key knowledge gaps persist in understanding how coupled physicochemical (e.g., sorption, redox reactions) and biological (e.g., microbial degradation, enzymatic activity) processes regulate chemical dynamics under varying soil properties, land-use practices, and climatic stressors. Furthermore, the integration of cutting-edge analytical, modeling, and management approaches remains essential to address challenges in sustainable agriculture, pollution remediation, and soil health preservation. Therefore, the related topics are strongly welcome including:

* Chemical Dynamics: Fate and transport of agrochemicals, organic/inorganic pollutants, residues (e.g., microplastics, biochar), and their metabolites.
* Analytical Innovations: Advanced techniques for tracking chemical speciation, transformation products, bioavailability, and process-level interactions in soils.
* Modeling Approaches: Predictive frameworks integrating process-based models, machine learning, and geospatial tools.
* Ecotoxicological Impacts: Bioaccumulation, trophic transfer, toxicity thresholds, and sublethal effects on soil biota, plants, and wildlife.
* Sustainable Strategies: Remediation technologies (e.g., bioremediation, phytomanagement), circular economy practices (e.g., waste-derived amendments), and policy-relevant guidelines.

By fostering dialogue across disciplines, this session aims to bridge fundamental science with practical solutions for mitigating soil contamination, enhancing nutrient efficiency, and safeguarding ecosystem services.

# Format

Oral presentation, Poster presentation, and Panel Discussion (maybe)

# Proposed Speakers

*Name:* Thomas Borch, *Title:* Professor of Agricultural and Environmental Chemistry, *Affiliation:* Colorado State University

*Name:* James Ippolito, *Title:* Professor, Rattan Lal Endowed Professor of Soil Health and Soil Fertility, *Affiliation:* Ohio State University.

*Name:* Wei Zhang, *Title:* Professor of Soil Physics, *Affiliation:* Michigan State University

*Name:* Kang Xia, *Title:* Professor, Associate Director of AgBioResearch, *Affiliation:* Michigan State University*Name:* Wan-Ru Chen; *Title:* Associate Professor; *Affiliation:* Department of Environmental Engineering, National Cheng Kung University, Taiwan; *Email address:* wruchen@mail.ncku.edu.tw; *Research Expertise:* Analytical method development for emerging contaminants, including PFAS, microplastics, and unknown compounds; Investigation of transformation pathways of emerging contaminants, such as oxidation and reduction processes in the environment; Study of interfacial reactions at liquid-solid interfaces and the transport of contaminants in the environment.

*Name:* Cheng-Hua Liu; *Title:* Assistant Professor; *Affiliation:* Department of Environmental Engineering and Science, Feng Chia University, Taiwan; *Email address:* chhengliu@fcu.edu.tw; *Research Expertise:* Environmental Soil Chemistry and Soil Physics, Environmental Application of Biochar, Soil Carbon Sequestration, and Sorption and Transport of Environmental Contaminants

*Name:* Cheng Gu, *Title:* Professor of soil environmental chemistry, *Affiliation:* Nanjing University

*Name:* Zeyou Chen, *Title:* Associated Professor of environmental biology and chemistry, *Affiliation:* Nankai University