



Grand Challenges in Environmental Chemistry

Mika Erik Tapio Sillanpää*

Department of Civil and Environmental Engineering, Florida International University, Miami, FL, United States

Keywords: catalysis, sorption, filtration, inorganic pollution, organic pollution, environmental analysis

Chemicals are introduced into the environment by numerous sources, including industry, households, transportation, agriculture etc. Environmental chemistry is a relatively new branch of chemistry that deals with the monitoring, transportation, transformation, and effects of these chemicals on environment and their physico-chemical removal. Thus, environmental chemistry deals not only with the effect of chemicals on the environment, but also the procedures and methods to eliminate the contamination. An important aspect of this is the development of ways to reduce the disposal of chemicals into the environment by removing and/or recovering pollutants prior to their release through degradation to innocuous end-products.

Our new journal, *Frontiers in Environmental Chemistry*, focuses on the characterization, analysis, monitoring, prevention, treatment, and control of anthropogenic and natural pollutants across all environmental matrices (air, water, soil, and sediment) using cutting-edge chemical technologies and tools. *Frontiers in Environmental Chemistry* was launched in April 2020 with the goal to create an interdisciplinary open-access journal to promote and disseminate high-quality research in its scope. As the Field Chief Editor, I am proud to be assisted by an outstanding Editorial Office and an excellent Editorial Board of a high number of reputed international researchers. I am confident that our journal will showcase the latest developments in the field of environmental chemistry to the whole world and, by bringing together environmental chemists from across the globe, help us to better understand the impacts of inorganic and organic pollution, develop more efficient technologies for clean air, water, and soil, and ultimately lessen humanities environmental impact.

The journal covers both the removal of pollutants by physico-chemical processes and the behavior of pollutants in the environment.

The treatment methods include, but are not limited to advanced oxidation processes, photocatalytic and catalytic remediation, electrochemical processes, sorption methods, coagulation, flocculation, flotation, filtration, and membrane processes. By publishing this research we hope to develop more efficient remediation techniques and advance current technologies. We hope to bring light to pilot studies and pave the way for their commercialization by replacing conventional treatments or integrating these physico-chemical approaches into existing plants thereby meeting ever more stringent environmental regulations.

The chemistry, transportation, transformation, and fate of inorganic and organic pollutants is fundamental to our understanding of the human influences on the environment and thus within the scope of the journal. Additionally, *Frontiers in Environmental Chemistry* covers the environmental analytical methods associated with the characterization of these pollutants and the evaluation of biogeochemical phenomena. Modeling and theoretical papers are also welcomed. By deepening our knowledge of the behavior and chemistry of pollutants we aim to identify and address emerging environmental issues and draw on a wide range of other disciplines to gain a deeper understanding of these issues and consequently their solutions.

We are launching the journal with six specialty sections (Separation Technologies, Sorption Technologies, Catalytic Remediation, Inorganic Pollutants, Organic Pollutants, and Environmental Analytical Methods), but the goal is to increase that number over the next few years (including

OPEN ACCESS

Edited and reviewed by:

Lu Shao,
Harbin Institute of Technology, China

*Correspondence:

Mika Erik Tapio Sillanpää
mikaesillanpaa@gmail.com

Received: 19 March 2020

Accepted: 30 March 2020

Published: 14 April 2020

Citation:

Sillanpää MET (2020) Grand Challenges in Environmental Chemistry. *Front. Environ. Chem.* 1:1. doi: 10.3389/fenvc.2020.00001

for example sections focused on modeling and theory, environmental degradation, and other chemical treatments). *Frontiers in Environmental Chemistry* has an aim to grow with a focus on the excellence of science.

1. The Separation Technologies section focuses on both traditional and emerging separation methods for water and air purification as well as novel separation methods for alleviating climate change. The section covers filtration and membrane processes.
2. The Sorption Technologies section includes both adsorption and absorption. This section covers for example synthesis, characterization, mechanisms, and applications of novel sorbents for environmental remediation, impacts of sorption on the fate of contaminants as well as integration of sorption with other environmental engineering processes.
3. The Catalytic Remediation section focuses on catalytic materials and catalytic elimination of environmental pollutants for water treatment, air pollution control, and clean energy production. This section aims to host significant advances in related areas including, but not limited to emissions control of mobile and stationary sources, photocatalytic/photoelectrochemical materials for air and water treatment, clean energy production, CO₂ capture and utilization, catalytic processes in biorefineries and fuel cells for environmental remediation and energy production.
4. The Inorganic Pollutants section publishes research across the aquatic, terrestrial, and atmospheric realms of the biosphere. This section focuses on understanding the transport of inorganic pollutants, their environmental transformations into more toxic or benign forms, and the chemistry influencing their interaction with biological tissue. This section includes, but is not limited to chemistry of metals and nutrients and their fate in the environment, atmospheric chemical reactions of inorganic pollutants and inorganic nanoparticles in the environment.
5. The Organic Pollutants section publishes research across the aquatic, terrestrial, atmospheric, and biotic realms of the global environment. This section focuses on understanding the transport, behavior, transformation, and impacts of organic pollutants in the environment. This section includes, but is not limited to the monitoring of emerging organic contaminants, the transformation of organic contaminants in all media and the fate, behavior and effects of the by-products, atmospheric chemical reactions of organic pollutants, fate of organic chemicals in wastewater treatment and drinking water treatment plants including sludge management and reuse.
6. The Environmental Analytical Methods section covers all the analytical aspects associated with the evaluation of biogeochemical processes. This section includes, but is not

limited to sampling, separation, detection, and quantification of environmentally relevant target compounds as well as quality control and quality assurance, speciation analysis, big data and chemometrics.

There is an ever-increasing need to study the removal and environmental effects of microplastics, pharmaceuticals, and numerous other emerging contaminants thus more efficient analytical methods are needed for their identification and quantification. Climate change mitigation and clean energy production also require our attention and are examples of highly topical research areas which can greatly benefit from the research published within *Frontiers in Environmental Chemistry*. This Grand Challenge covers all specialty sections of *Frontiers in Environmental Chemistry*.

By gathering this research into one, open-access journal, we aim to grow with a focus on the excellence of science. We want to bring together researchers, encourage collaboration and create an accessible platform for all environmental chemists. This open-access journal publishes rigorously peer-reviewed research that advances understanding of various aspects of environmental chemistry. *Frontiers in Environmental Chemistry*, will be at the forefront of disseminating scientific knowledge and impactful discoveries to researchers, policy-makers, and the general public all over the world.

Frontiers in Environmental Chemistry publishes high-quality fundamental and applied research across the field of Environmental Chemistry. All studies must contribute to the advancement of Environmental Chemistry and concomitantly to deepen knowledge into the subject. We welcome original research articles, critical reviews on subjects of broad interest, mini reviews on topical issues, perspectives and opinions. All contributions need to present new insights and attract broad interest in various disciplines.

I eagerly look forward to working with the publisher, editors, reviewers, and authors of *Frontiers in Environmental Chemistry*.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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