

Our Selections for the Best *ES&T Letters* Papers in 2023



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Over the past few years, the *Environmental Science & Technology* community has demonstrated exceptional resilience. Following disruptions by a global pandemic and other changes, environmental scientists, engineers and health professionals have continued to engage topics that matter to people and the planet through innovation, collaboration, and translation. Earlier this year at the sixth United Nations Environment Assembly, the triple planetary crisis of climate change, biodiversity loss, and pollution received particular focus (<https://www.unep.org/news-and-stories/press-release/un-environment-assembly-advances-collaborative-action-triple>). These shared threats to our common home require effective, efficient and equitable interventions by governments, industry, and human activities. Herein, the creative contributions by our community will remain essential in the coming years. As we continue to advance the science and improve the practice for public health, biodiversity, and ecosystem services, we must remain resilient in the face of regional and global changes.

Once again, the team of editors at *Environmental Science & Technology Letters (ES&T Letters)* are excited to announce the winners of the best papers award from those manuscripts published in the journal during 2023. We are immensely grateful to have this important opportunity to reflect on *ES&T Letters* publications from last year and to recognize the quality of manuscripts from so many diverse topics contributed by members of the environmental science, engineering, and health communities, who are performing essential research around the world. The contributions of so many authors and reviewers during 2023 underscore the resiliency of our community, including topics that are directly engaging the triple planetary crisis of climate change, biodiversity loss, and pollution.

To make these selections, we ask our Editorial Advisory Board members to nominate manuscripts based on the quality of work, particularly as these contributions align with our aim to facilitate communication of timely and important findings. These nominations are then ranked by our team of editors to identify the winners. Please join us in warmly congratulating these particularly exceptional *ES&T Letters* papers from 2023.

■ BEST LETTER ARTICLES

Biofilm Formation Influences the Wettability and Settling of Microplastics

Pete, A.J.; Brahana, P.J.; Bello, M.; Benton, M.G.; Bharti, B. <https://pubs.acs.org/doi/10.1021/acs.estlett.2c00728>

Harnessing Semi-Supervised Machine Learning to Automatically Predict Bioactivities of Per- and Polyfluoroalkyl Substances (PFASs)

Kwon, H.; Ali, Z.A.; Wong, B.M. <https://pubs.acs.org/doi/10.1021/acs.estlett.2c00530>

Per- and Polyfluoroalkyl Substances in Canadian Fast Food Packaging

Schwartz-Narbonne, H.; Xia, C.J.; Shalin, A.; Whitehead, H.D.; Yang, D.W.; Peaslee, G.F.; Wang, Z.Y.; Wu, Y.; Peng, H.; Blum, A.; Venier, M.; Diamond, M.L. <https://pubs.acs.org/doi/10.1021/acs.estlett.2c00926>

Per- and Polyfluoroalkyl Substances in Toilet Paper and the Impact on Wastewater Systems

Thompson, J.T.; Chen, B.T.; Bowden, J.A.; Townsend, T.G. <https://pubs.acs.org/doi/10.1021/acs.estlett.3c00094>

Sunlight-Induced Transformation of Tire Rubber Antioxidant N-(1,3-Dimethylbutyl)-N'-phenyl-p-phenylenediamine (6PPD) to 6PPD-Quinone in Water

Zhou, Y.J.; Yixi, L.; Kong, Q.Q.; Peng, J.L.; Pan, Y.H.; Qiu, J.L.; Yang, X. <https://pubs.acs.org/doi/10.1021/acs.estlett.3c00499>

■ BEST REVIEW ARTICLES

Environmental Occurrence and Toxicity of 6PPD Quinone, an Emerging Tire Rubber-Derived Chemical: A Review

Benis, K.Z.; Behnami, A.; Minaei, S.; Brinkmann, M.; McPhedran, K.N.; Soltan, J. <https://pubs.acs.org/doi/10.1021/acs.estlett.3c00521>

Indoor Air Quality in Urban India: Current Status, Research Gap, and the Way Forward

Thakur, A.K.; Patel, S. <https://pubs.acs.org/doi/10.1021/acs.estlett.3c00636>

The first of our Best Paper Awards is by **Amber et al.**, who investigated how biofilm formation on microplastics influences vertical sinking and floating dynamics. The authors tested the hypothesis that biofilm formation leads to sinking, but revealed that biofilms produced by specific species of microorganisms (e.g., *Alcanivorax borkumensis*) incorporate highly active biosurfactants, which lead to vertical downward transport of microplastics. However, biofilms produced by other microorganisms without this feature did not sink (e.g., *Anabaena* sp.; *Synechococcus elongatus*). The research contributes to understanding transport and fate dynamics by highlighting that the

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formation and the properties of biofilms appear to govern sinking or floating of plastics in aquatic systems.

In 2023, *ES&T Letters* continued to publish a number of timely contributions on environment and health implications and management of PFAS. Three of the year's Best Papers winners focused on PFAS chemistry, environmental exposure and environmental fate and transport. In "Harnessing Semi-Supervised Machine Learning to Automatically Predict Bioactivities of Per- and Polyfluoroalkyl Substances (PFASs)," **Kwon and colleagues** developed a semi-supervised quantitative-structure activity relationship (QSAR) model to address the need for efficient PFAS bioactivity assessment. Designed to overcome the limitations of costly and time-consuming traditional testing, this model classifies bioactive PFAS and identifies key substructures. It was validated through structural alerts and molecular docking, which thus provided a useful tool for prioritizing assessment across various PFAS compounds. We rely on food for survival, and packaged food products are increasingly consumed in many regions around the world. In the second Best Paper Award from 2023 that studied PFAS, **Schwartz-Narbonne et al.** identified PFAS compounds in 42 different Canadian fast food packaging. Interestingly, these findings reported that 45% of packing contained trace levels of fluorine (F), with the highest concentrations of total F detected in four samples of molded fiber-based bowls. Such "compostable" bowls contain higher levels of PFAS to render them water resistant, but are marketed as "green" alternatives to plastic bowls. Thus, such observations contribute to "green washing" in the market place, and represents a regrettable substitution of plant-fiber based materials for single-use plastic food packaging. **Thompson et al.** reported on the PFAS levels present in wastewater originating from used toilet paper. This unanticipated source of PFAS arises from use as a wetting agent in the pulping process. The authors confirmed toilet paper as a potentially major source of PFAS entering wastewater treatment systems from four world regions (Africa, North America, South and Central America and Western Europe). 6:2 Fluorotelomer phosphate diester (6:2 diPAP) was the most prevalent PFAS detected in eight wastewater treatment plants in Florida, USA, and toilet paper usage could potentially contribute between 6.4 to 80 $\mu\text{g}/\text{person-year}$ of 6:2 diPAP to wastewater-water systems.


Our final Letter Best Paper winner, **Zhou et al.**, reported on the photolysis of the tire rubber antioxidant contaminant 6PPD (*N*-(1,3-dimethylbutyl)-*N'*-phenyl-*p*-phenylenediamine) to form the degradation product 6PPD-Q (6PPD-quinone), which can elicit surprisingly high aquatic toxicity, under simulated sunlight irradiation. The transformation mechanism started with photoexcitation of 6PPD to the triplet state followed by hydroxylation of the ring, and then formation of the 6PPD-Q, with an overall yield of 1%. The work provided evidence that sunlight-induced transformation of 6PPD could be an additional pathway to introduction of 6PPD-Q in aquatic environments.


In our **Best Review** paper category, we selected two winners from 2023. **Benis et al.** summarized knowledge on the environmental chemistry and toxicity of 6PPD-Q. Highlighted in 2021 due to its presence in stormwater runoff and corresponding lethality to Coho salmon, research on 6-PPDQ has since advanced quickly, and this review highlights emerging knowledge regarding its broader risks to human health and the environment. This unique resource has likely been helpful to scientists and policy makers alike, and serves as a good reminder


that we should always consider transformation products in the assessments of new and existing synthetic chemicals.


Recent trends indicate that individuals are spending more time indoors than outdoors, a phenomenon also observed in developing countries such as India. In our final Best Review paper by **Thakur et al.**, the authors compare existing knowledge regarding Indoor Air Quality (IAQ) measurements, modeling, and mitigation strategies between developed countries and India. The findings underscore the insufficient resources allocated to IAQ research in India, highlighting the need to accelerate research efforts in both IAQ and ambient air pollution. Furthermore, the authors emphasize the importance of disseminating research findings and translating this knowledge into actionable guidelines to protect inhabitants from indoor air pollution. This review also supports our commitment to publish impactful papers that will accelerate environmental research to achieve the Sustainable Development Goals.

As *ES&T Letters* continues to move from strength to strength publishing high quality and timely and impactful research in environmental science and engineering from around the world, we would like to recognize the outstanding author community submitting their best work to *ES&T Letters*. We look forward to receiving your timely and impactful research findings, which we aim to rapidly assess with support from committed reviewers. For example, current mean times from submission to peer review decision is only 22 days and from submission to an accept decision is just 35 days, in order to publish your impactful and timely research as quickly as possible. Thank you for your outstanding research contributions as we continue to remain resilient for people and the planet.


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Zhanyun Wang

■ AUTHOR INFORMATION

Complete contact information is available at:
<https://pubs.acs.org/10.1021/acs.estlett.4c00981>

Notes

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