University of Glasgow

Decentralised Water Technologies

Funded by EPSRC

Microplastics as Vectors for Emerging Contaminant transport in Aquatic and Terrestrial Ecosystem

Academic Seminar

About the Seminar:

- **Professor Meththika Suharshini Vithanage** will discuss the aspects of emerging micro-plastic contaminants in environmental systems, such as medications, personal care products, insecticides, and industrial chemicals.
- **Date and Time:**

  Wednesday 27th September 2023, 10:30-11:30 am BST
- **Meeting location:**

  James Watt South Building: **361 Seminar Room**
- **Host:**

  Dr Siming You (Siming.You@glasgow.ac.uk)

About the presenter:

- Meththika Vithanges is a Professor in Natural Resources and the founding director at the Ecosphere Resilience Research Centre, University of Sri Jayewardenepura, Sri Lanka. She is now serving as an Adjunct Professor in the Institute of Agriculture, University of Western Australia and National Institute of Fundamental Studies, Sri Lanka.
- Her academic background covers water chemistry, environmental remediation of toxic metals, antibiotics, agrochemicals, microplastics and waste biomass conversion. She was elected as a Fellow of the National Academy of Sciences in Sri Lanka (NASSL) in 2022. She is a Highly Cited Researcher – 2021 by Clarivate and the prestigious Fayzah M. Al-Kharafi award from The World Academy of Science (TWAS) in 2020 was awarded to her. She was awarded as the Most Outstanding Senior Researcher in Physical Sciences by the Committee of Vice Chancellors and Directors, Sri Lanka in 2020. She has received Presidential Awards for Scientific Publications for 12 years from the National Research Council of Sri Lanka. She has secured more than 500,000 US Dollars from National and International Grants.
- Prof. Meththika Vithanges became the Chairperson of the Young Scientists Forum in 2017 and awarded as the Best Young Scientist, 2018 by the Young Scientist Forum of the National Science and Technology Commission, Sri Lanka. She is one of the leading researchers on Biochar and listed in the top 10 authors who have published SCI articles on biochar. Further, she was listed as Top 2% of the most cited scientists across various disciplines globally in 2017, 2019, 2020 and 2021. She has contributed over 225 Science Citation Indexed journal articles, over 50 book chapters and 10 co-edited books published by Elsevier, Springer, Wiley and CRC Press. Her citation record is over to 20000 with an H index of 69.

About Decentralised Water Technologies:

- **The Decentralised Water Technologies** project will accelerate the delivery of decentralised water technologies by bringing the most up-to-date bioscience and energy engineering to bear. It will re-write emerging design rules for engineering biology to ensure that off-grid environmental biotechnologies can be configured with confidence. Bespoke microbial treatment communities will be evolved using a new suite of high-throughput synthetic-biology inspired, experimental platforms. For rural populations and UK Islands and in the developing world, from sub-urban Bangkok to the Amazon and Arctic Canada, we will develop site-specific off-grid integrated heat/water technologies. We will develop low-cost sensors, real-time monitoring and adaptive control for remote distributed water infrastructure. With water technology companies, we will analyse how suites of technologies can be configured and controlled to shape new models for decentralised provision. Scottish Water will invest significantly in co-creating rural demonstrators and a mobile technology-demonstration platform for sustainable communities and with Northumbrian, Welsh Water and other utilities and stakeholders we will build momentum for a radically new low-carbon decentralised future for the water industry Working with professional bodies and innovation centres we will create a global centre of excellence in off-grid water provision, with the drive and passion to deliver transformational change; helping to deliver 2050 net-zero carbon and Sustainable Development Goal 6.

Abstract:

- Emerging contaminants in environmental matrices include medications, personal care items, insecticides, and different industrial chemicals. Microplastics from primary and secondary sources act as transporters for these contaminants, allowing them to move more easily through water and soil systems. Microplastics in aquatic settings can adsorb emerging pollutants from the surrounding water column, resulting in increased mobility and persistence. These contaminated microplastics can be consumed by aquatic creatures, causing bioaccumulation of emerging pollutants in the food web. This occurrence raises worries about potential environmental and human health hazards. Similarly, microplastics in soil settings can bond with developing pollutants, affecting their destiny and transport pathways. Microplastics may operate as carriers for contaminants to travel vertically through the soil profile, potentially reaching groundwater supplies. The interaction of microplastics with soil biota increases the ecological repercussions of this vector transmission even more. Understanding microplastics' vector transport capability for emerging pollutants is critical for assessing environmental risks and establishing effective mitigation methods. This emphasizes the importance of interdisciplinary study to understand the mechanisms driving interactions between microplastics and emerging toxins, their effects on ecosystems, and the possible consequences for human health. A comprehensive understanding of these dynamics is essential for developing sustainable solutions to mitigate the spread of emerging contaminants in water and soil systems, safeguarding the health of both ecosystems and human populations.

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