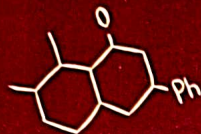


ISBN: 978-81-953059-9-5



BOOK OF ABSTRACTS

INTERNATIONAL CONFERENCE ON

EMERGING FRONTIERS IN
CHEMICAL SCIENCES

EFCS-2023

19 - 21 DECEMBER 2023



POSTGRADUATE AND RESEARCH DEPARTMENT OF CHEMISTRY

FAROOK COLLEGE (AUTONOMOUS)

P.O. Farook College, Kozhikode, Kerala, India- 673 632

Aided by Govt. of Kerala and Affiliated to the University of Calicut

A College with Potential for Excellence (CPE) | Re-accredited at 'A+ Grade' by the NAAC
A Minority Educational Institution



ACS
Chemistry for Life®

PP-33

Thermal analysis as a tool to address the effect of microplastics in soil**Suhada Kottakuth Matayil^{a,b} and Yamuna Kunhi Mouvenchery^{a,c*}**^aMalabar Christian college, Calicut,^bKAHM Unity Women's College, Manjeri,^cN.S.S. College ManjeriE-mail: kmyamunanssmji@gmail.com

Abstract: Microplastics (MP) that are plastic particles of less than 5mm diameter are being increasingly attended by researchers across the world, owing to the pollution threat they pose, in all compartments of the environment including living organisms¹. The nature of interactions that the MP particles induce within the environmental matrixes needs to be addressed since properties and hence processes are governed by structure-level interactions. This would help understanding and predicting the behaviour of MP in soil and water, leading to development of mitigation strategies, on long run.

This pilot study, therefore, aims at unravelling the influence of engineered microplastics – polyethylene (PE), polystyrene (PS) and polyvinylchloride (PVC) – on properties of a forest soil sample. Soil samples were spiked with polymers in batches, equilibrated and then assessed for various structure-relevant properties and processes. This part of the work shows results from thermoanalytical studies: low-temperature DSC and TGA-DSC analysis. These techniques would give implications on changes in soil matrix rigidity and thermal stability of different structural fractions, respectively, caused by the introduction of the three MP polymers².

Results from thermal analysis as well as other chemical tests (water content, available C, etc.) show that chemical nature and abundance of polymer particles significantly affects the structural stability and hence related properties of soil. This is suggestive for that polymer microparticles induce notable interactions within soil matrix, instead of merely occupying the interparticle voids. This has serious consequences on structure and properties of soil matrix, bringing in additional concerns than sole effect of MP. This study is among the first ones to assess the structure-level consequences of MP particles in soils. Further studies on the effects of MP on various

environmental processes are being undertaken, which explore higher dimensions of MP pollution in soil.

References:

1. Arthur, C., Baker, J. & Bamford, H. Proceedings of the International Research Workshop on the Occurrence, Effects, and Fate of Microplastic Marine Debris. Group 530 (2009).
2. Kunhi Mouvenchery, Y. et al. Insight into physicochemical structure of soil organic matter by cation interaction and nanothermal properties, (2013).