EMEC21

21st European Meeting on Environmental Chemistry
November 30 – December 3, 2021, Novi Sad, Serbia

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Serbian Chemical Society

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BOOK OF ABSTRACTS

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Publisher

Serbian Chemical Society

Karnegijeva 4/III, Belgrade, Republic of Serbia

For the publisher

Dušan Sladić

President of the Serbian Chemical Society

Editors

Ivana Ivančev-Tumbas

Vladimir P. Beškoski

Aleksandra Šajnović

Cover page photo

Branko Lučić

Design and prepress

Beoživković, Belgrade

Printed by

RIS Studio, Belgrade

Circulation

150

ISBN

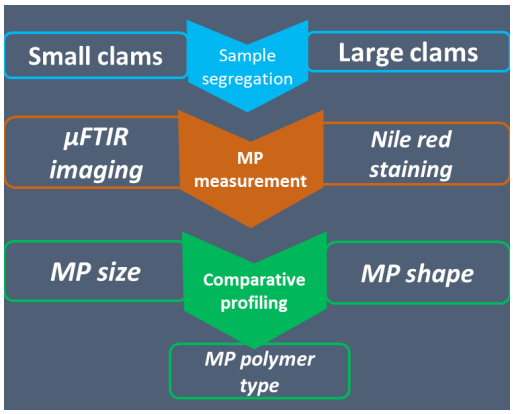
978-86-7132-078-8

Year

2021

Comparative Profiling of Microplastics in Differently sized Manila Clams from South Korea by Nile Red Staining and µFTIR

M. Krishna de Guzman[1,2,], V. Jovanović[3], J. Jung[4], J. Kim[4], T. Cirkovic Velickovic[1,3,5]. (1) Center for Food Chemistry and Technology, Ghent University Global Campus, Incheon, South Korea, (2) Department of Food Technology, Safety, and Health, Faculty of Bioscience Engineering, Ghent University, Belgium, (3) Faculty of Chemistry, Centre of Excellence for Molecular Food Sciences, University of Belgrade, Serbia, (4) Korea Institute of Analytical Science and Technology, Seoul, South Korea, (5) Serbian Academy of Sciences and Arts, Belgrade, Serbia; [*]mariakrishna.deguzman@ugent.be.*



The high bioavailability of microplastics (MP) to marine biota has led to the contamination of seafood products. The safety of shellfish as food has become questionable due to the potential health risks associated with MP. As such, microplastics ingestion by commonly consumed shellfish is being investigated. In this study, market samples of clams (*Ruditapes philippinarum,* n=101) from South Korea were segregated into two different sizes (small and large) and analysed for microplastics contamination. Using alkaline digestion, MP were extracted and subsequently quantified using two of the most commonly used techniques in the field- Nile red staining (NRS) and µFTIR imaging [1], [2]. With NRS, the small (n= 51) and large (n= 50) clams were analysed individually. On the other hand, 8 composite subsamples (30 small and 31 large clams) were subjected to µFTIR imaging.

The average MP concentration based on NRS was 4.3 ± 5.2 MP/ g ww (wet weight of soft tissue) considering both small and large clams. In the subsamples, 3.2 ± 1.6 MP/ g ww and 3.8 ± 1.7 MP/g ww were detected based on µFTIR and NRS, respectively. NRS showed 18-75% higher MP quantity compared to µFTIR. This was considered to be a consequence of the co-staining of remnants of undigested biological which was confirmed by additional staining using DAPI. Due to this overestimation, only µFTIR data was utilized for the comparative analysis of the differently sized clams.

The MP abundance in both groups was comparable, with the small and large clams having 2.7 ± 1.7 MP/g ww and 3.6 ± 1.6 MP/g ww, respectively. Similarly, there was no significant difference observed in the concentration of MP fibers and MP non-fibers. In the small clams, only PS (polystyrene) and PET (polyethylene terephthalate) were identified from the fibers. In contrast, PP (polypropylene), PS (polystyrene), PE, and PET were found from the fibers that came from the large clams. The same 4 synthetic polymers were detected from the non-fibers obtained from both groups. Overall, PS was the most prominent type, accounting for 35-49% of total detected MP. In terms of MP size, 20-50µm was the most abundant followed by 50-100µm. Relative to the weight of the samples, the quantity of MP, classified according to size and polymer type, was similar in both groups.

In summary, the size of the clams had no effect on the MP content as suggested by the analogous concentrations of MP with respect to shape, size, and polymer identity. In addition, despite the simplicity, low-cost, and growing popularity of NRS, this method should be used with caution due to its propensity to overestimate MP quantity.

Acknowledgements

This study was supported by Ghent University Global Campus, Special Research Fund (BOF) of Ghent University (no. 01N01718), and Horizon2020 Food-EnTwin (no. 810752).

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