Microplastic concentration in the Danube River, Hungary

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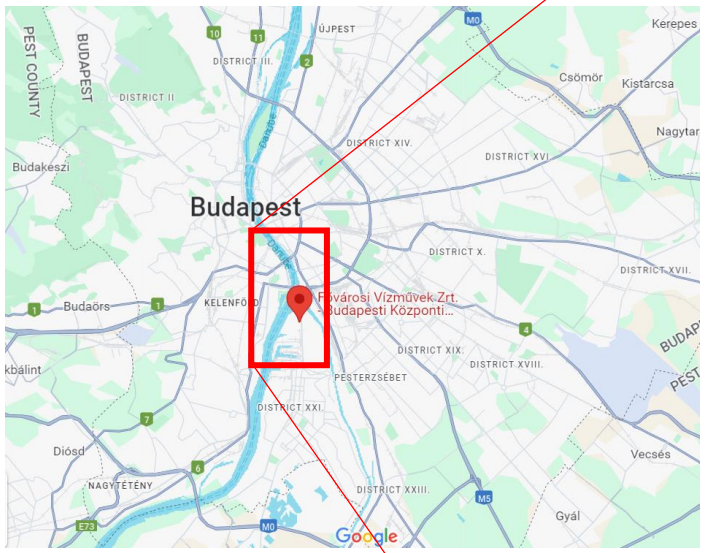
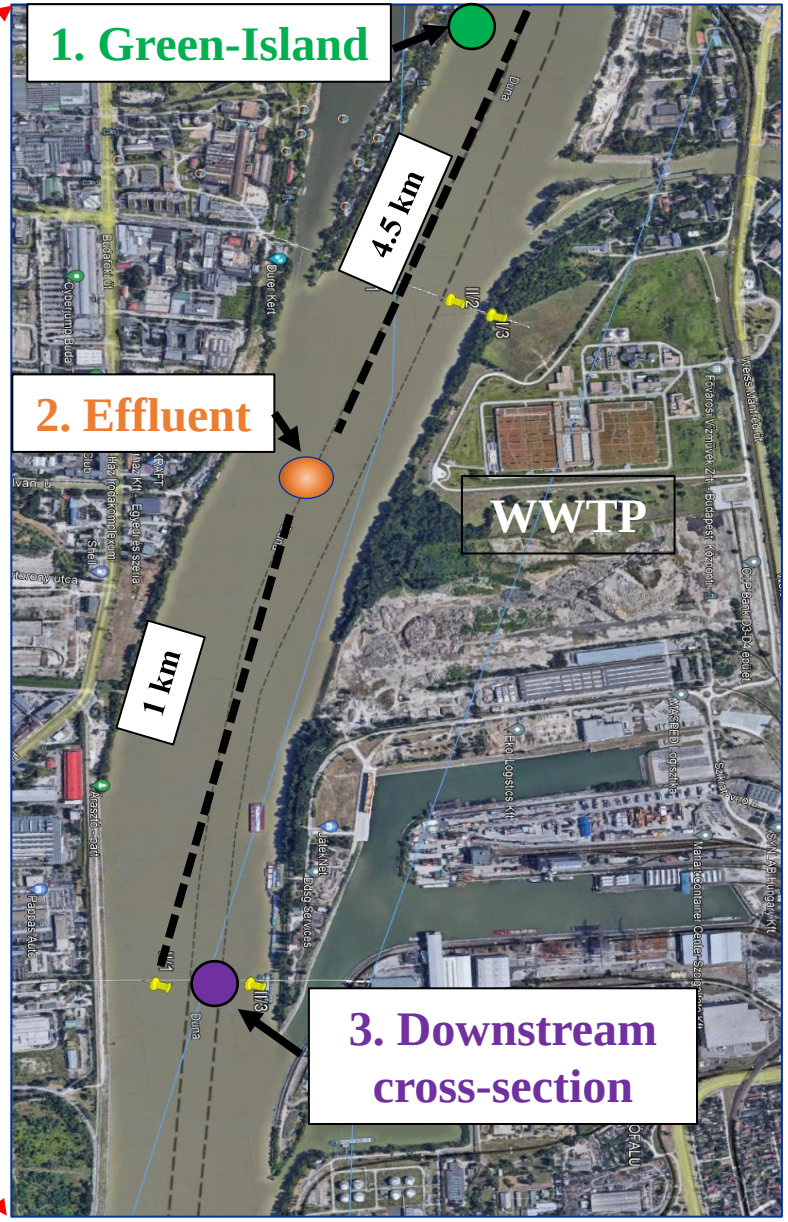
Conference on Microplastics in drinking water – from source to tap 3 October, 2024



Location of sampling campaign in 2023



1. Green Island

From April to November (monthly&daily)
Sampling by pump and sieves
Fractions: 70-150 µm and >150 µm
Volume: 0.09-1.62 m3

2. WWTP effluent

From February & April
Effluent sampling by pump and sieves (Pore size > 63 µm)
Volume: 135 L

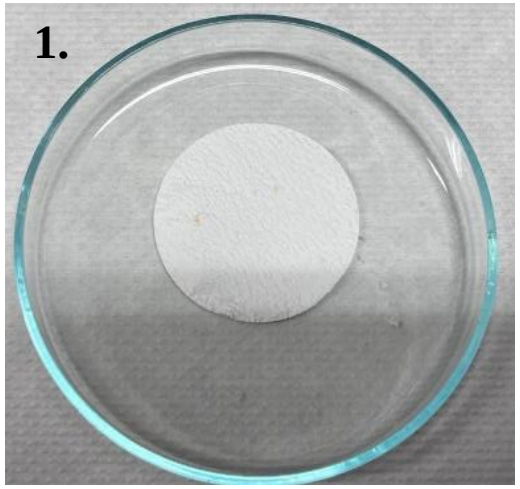
3. Downstream – cross section

Sampling by pump and sieves
Cross sections (Left, middle and right bank)
Fractions: 70-150 µm and >150 µm
Volume: 0.54 m3

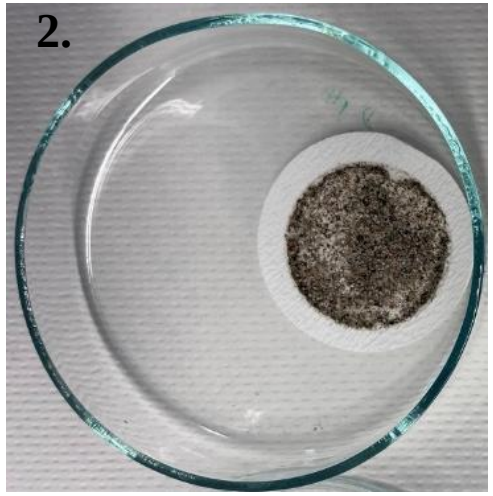
Laboratory analysis

Step 1. Removal of organic matter

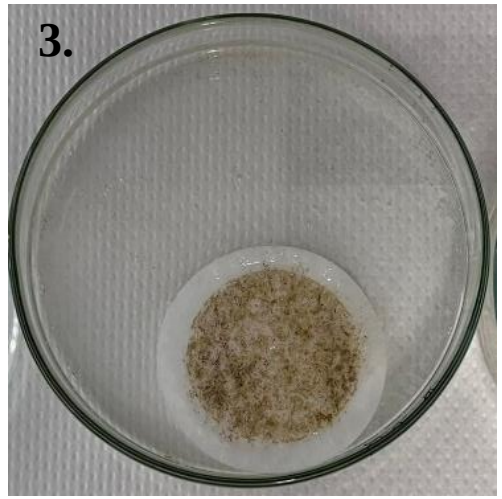
Empty filter



Glass fibre filter: pore size 0.7 µm



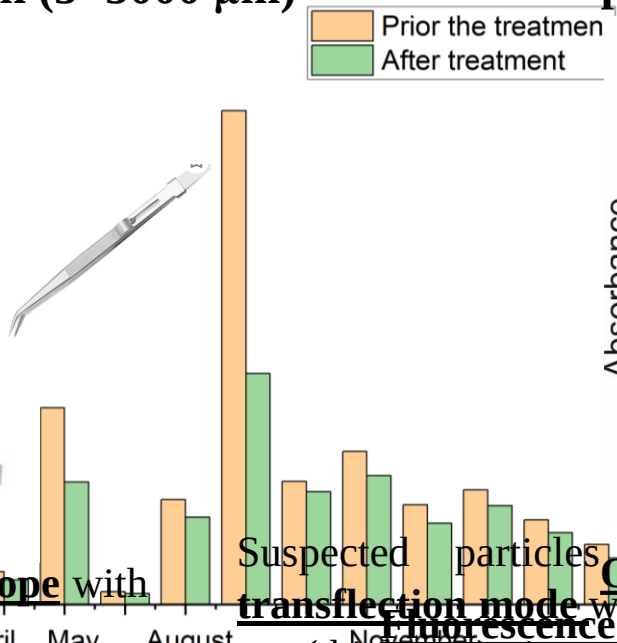
After filtration



After removal of organic matter

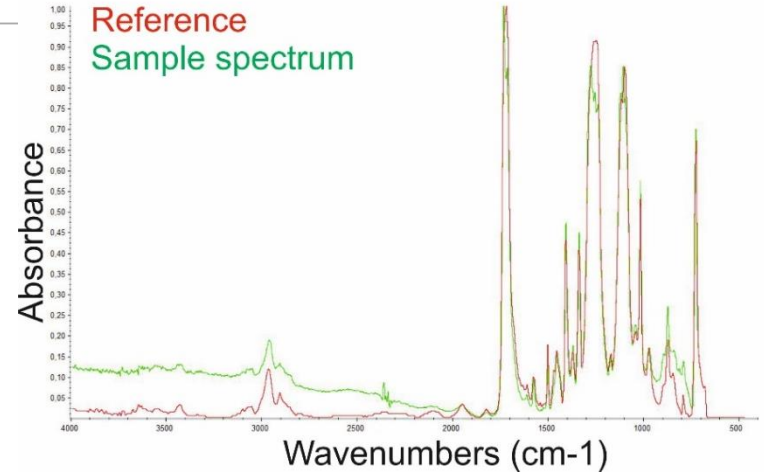
H_2O_2 30%, 30 ml for 7 days (Nuella et al., 2014).

Step 2. Characterization & quantification (5- 5000 µm)



Visual inspection using **stereomicroscope** with magnification of 5-50x

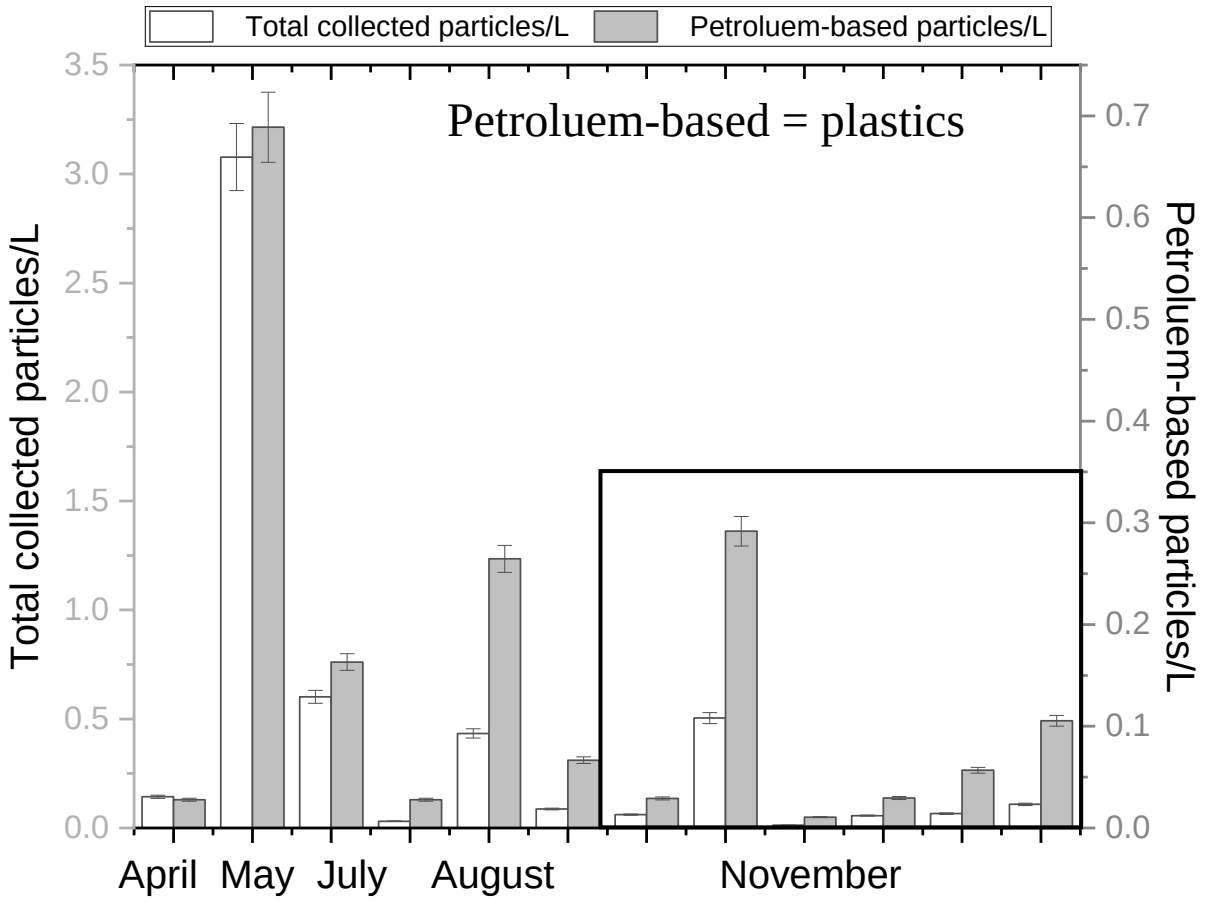
Step 3. Identification of chemical composition– FT-IR



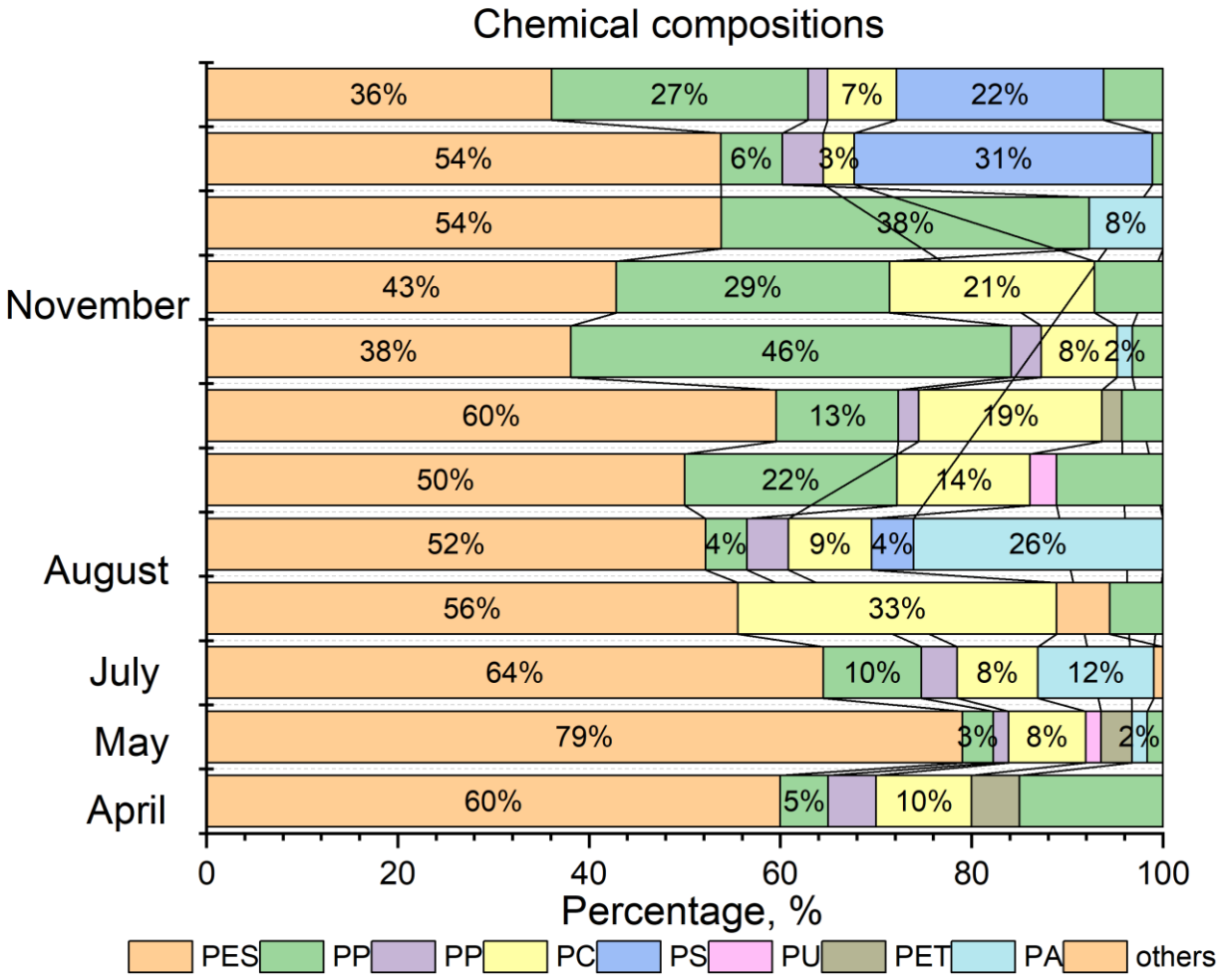
Suspected particles were characterized using **FT-IR spectrometer in transflection mode** were performed on a Bruker Vertex 70 FT-IR **Olympus BX 61 Fully Motorized Fluorescence Microscope**, with magnification of 40-1000x. The least 10x10 µm (thickness), 4 cm-1 resolution and 128 scans was obtained from each particles.

Results I - Green Island

Concentration of total solid particles/L and petroleum-based particles/L



Petroluem-based = Synthetic polymers

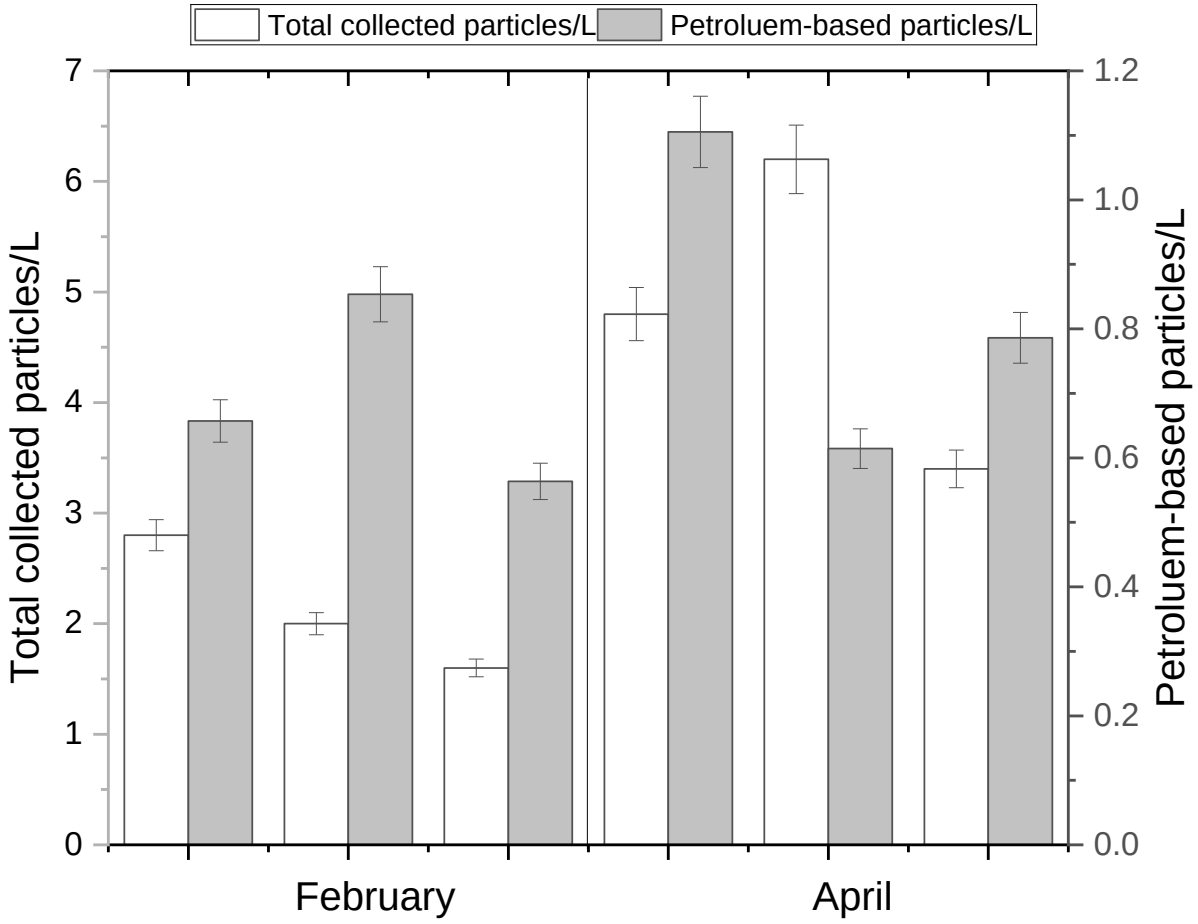


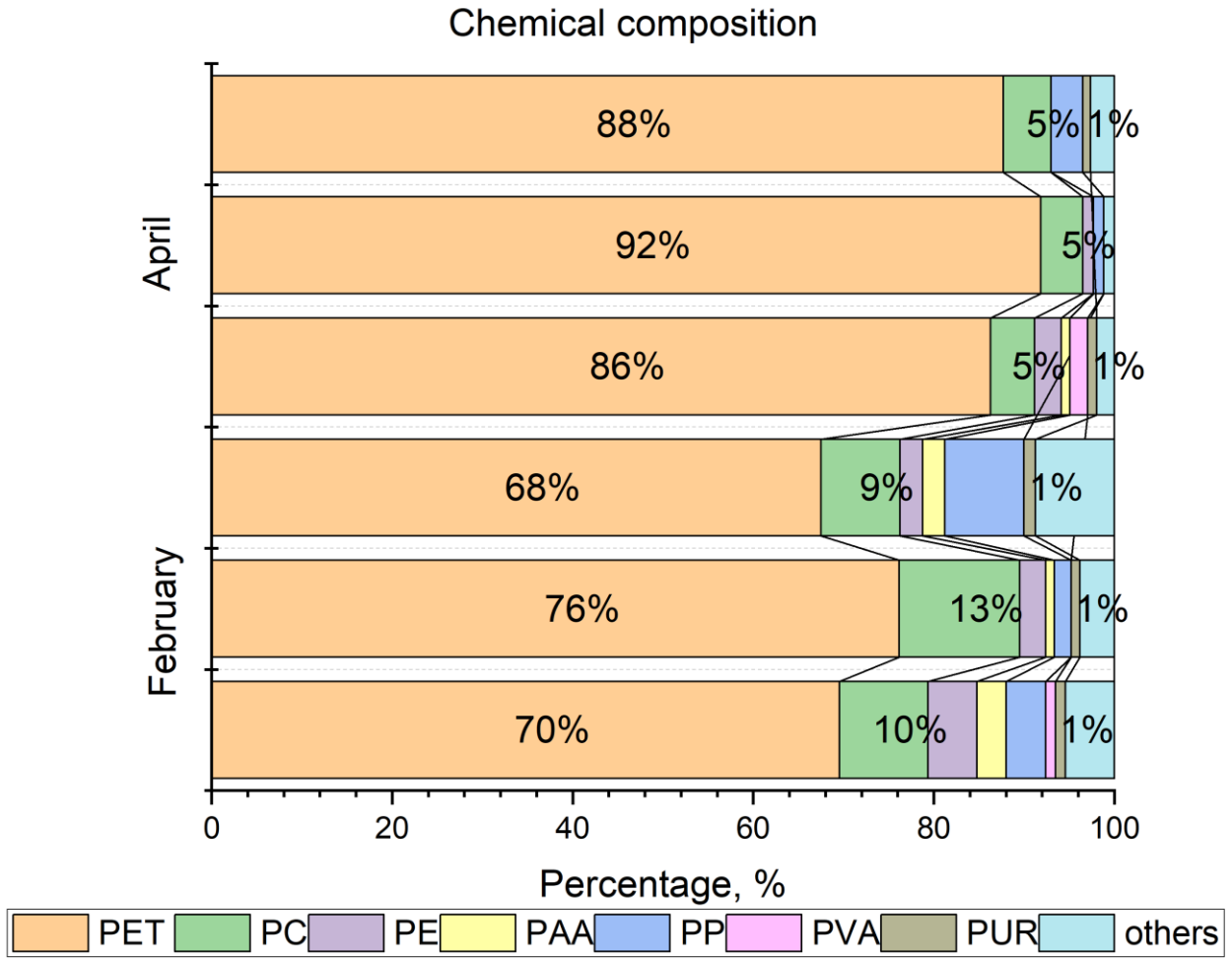
0.02 – 0.6 petroleum-based particles/L

- Fibers were dominant in all sampling campaign as well as on different days and in different sieve mesh sizes.

Results II - WWTP

Concentration of total solid particles/L and petroleum-based particles/L





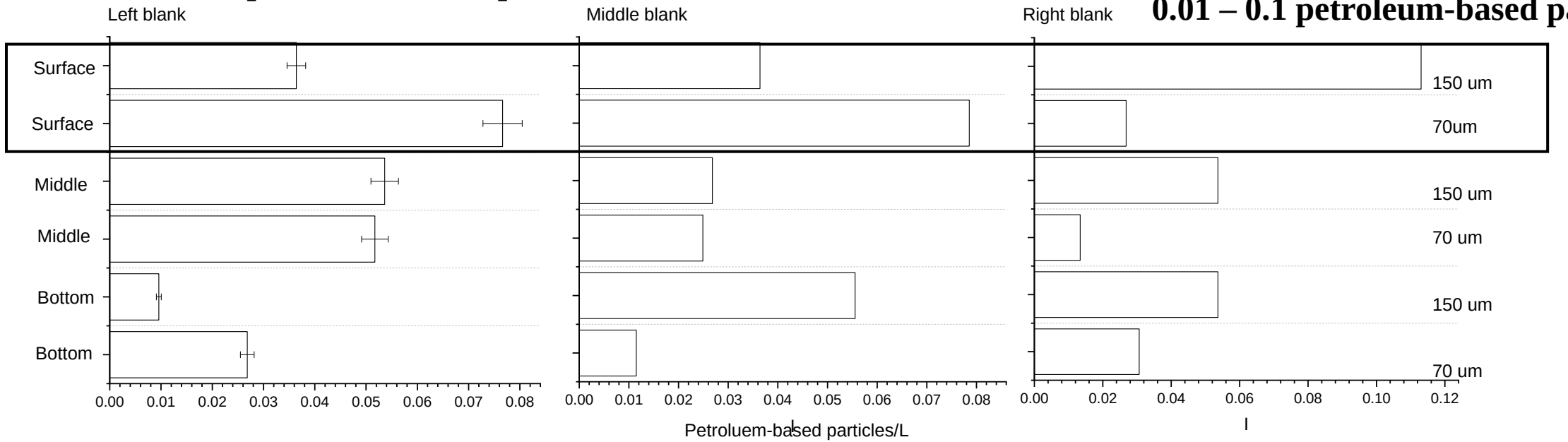
0.5 – 1.1 petroleum-based particles/L

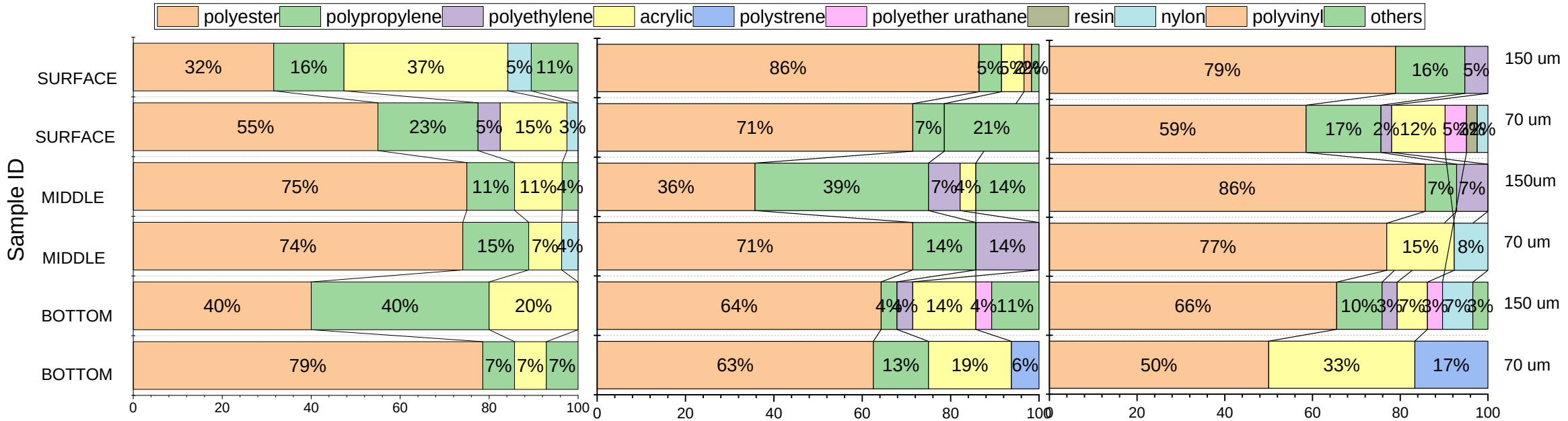
Tserendorj et al., 2024

Results III - Downstream

Concentration of total petroleum-based particles/L

0.01 – 0.1 petroleum-based particles/L





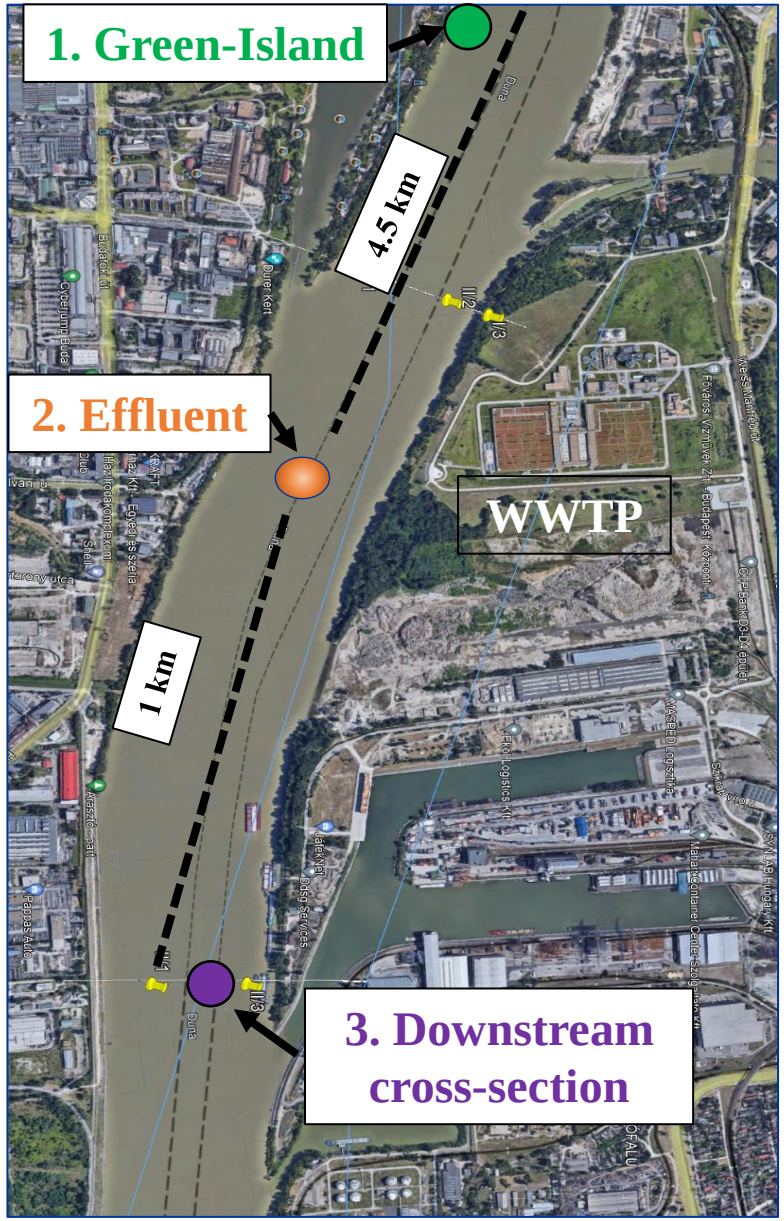
Take home message

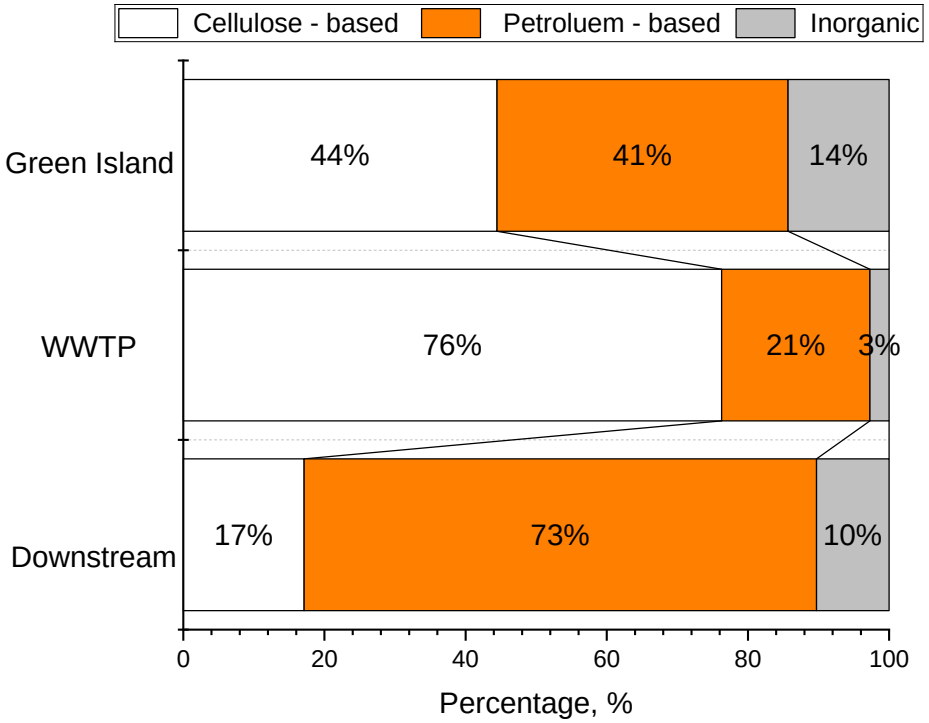
Microplastic concentrations (MPs)/L

Ranged between 0.02 to 0.6 MPs/L
> 70 -150 µm 0.03 MPs/L
> 150 µm 0.09 MPs/L

Ranged between 0.5 – 1.1 MPs/L in > 63 µm (*Tserendorj et al., 2024)*

Ranged between 0.01 – 0.1 MPs/L
> 70-150 µm 0.03 MPs/L
> 150 µm 0.04 MPs/L





Acknowledgement

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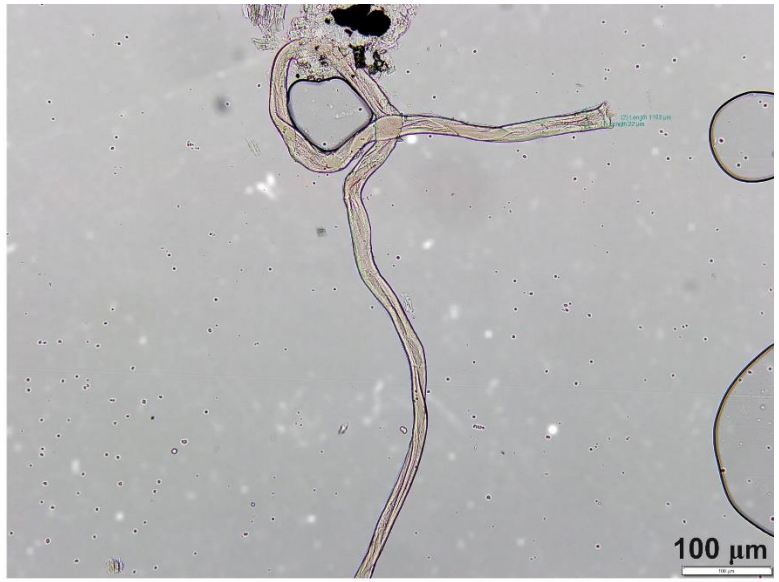
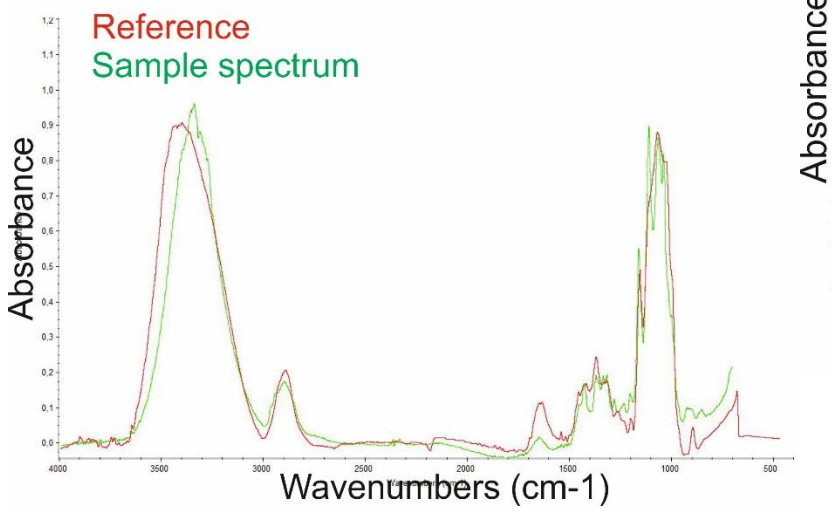
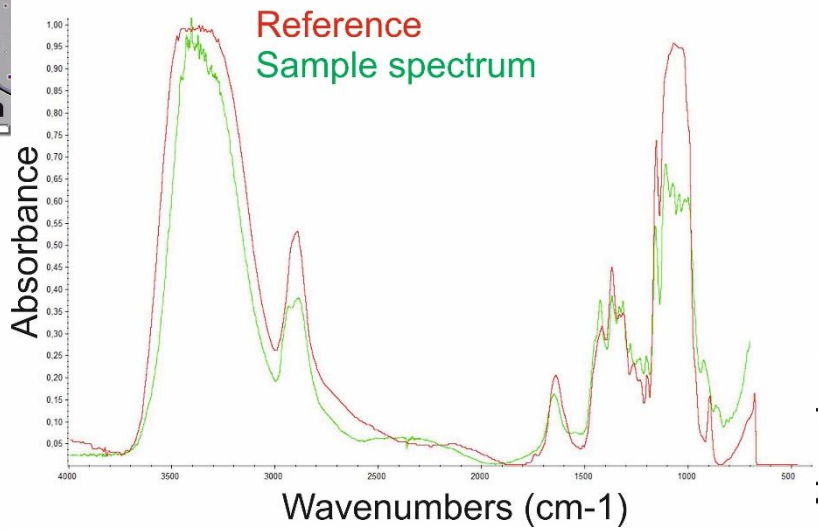
Thank you for your attention! 🙂


100 µm


1554 µm
26 µm
Rayon
200 µm


601 µm
24 µm
Polyester (PE)
50 µm


Reference
Sample spectrum
Absorbance
Wavenumbers (cm-1)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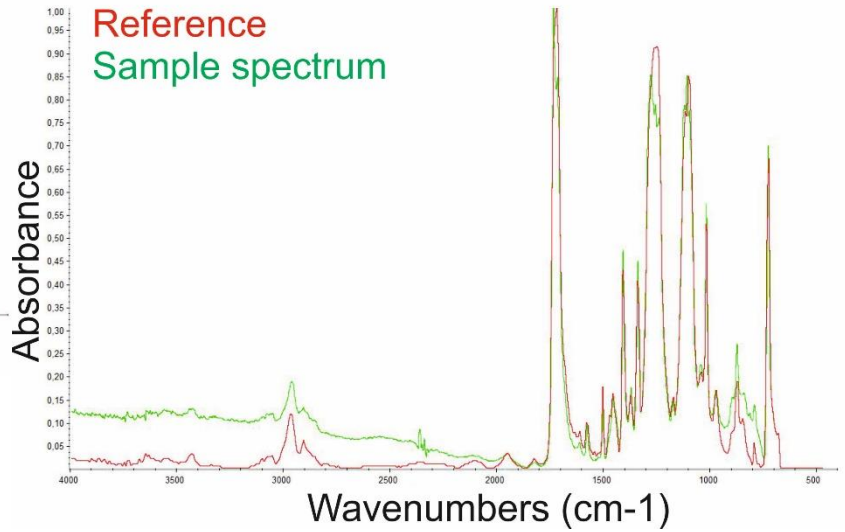
Reference
Sample spectrum
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