

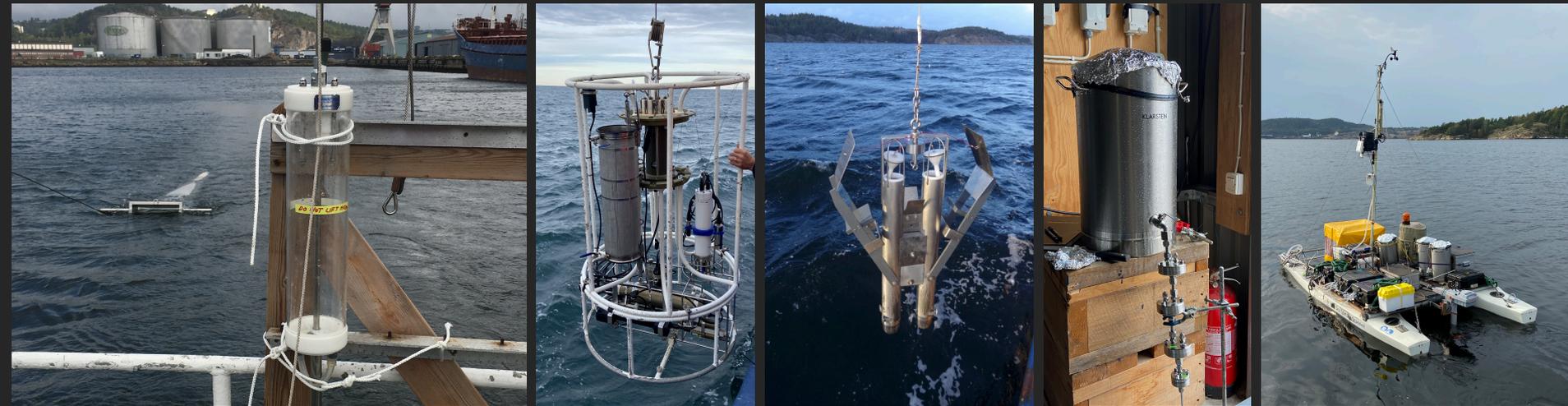


UNIVERSITY OF
GOTHENBURG

IDENTIFICATION AND CHARACTERIZATION OF ENVIRONMENTAL MICRO- AND NANOPARTICLES

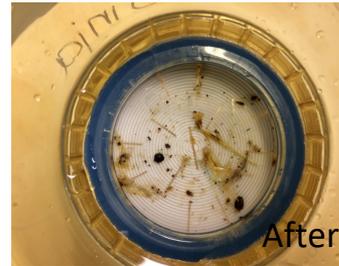
KARIN MATTSSON, MARTIN HASSELLÖV

Sampling of particles in water (or other liquids)



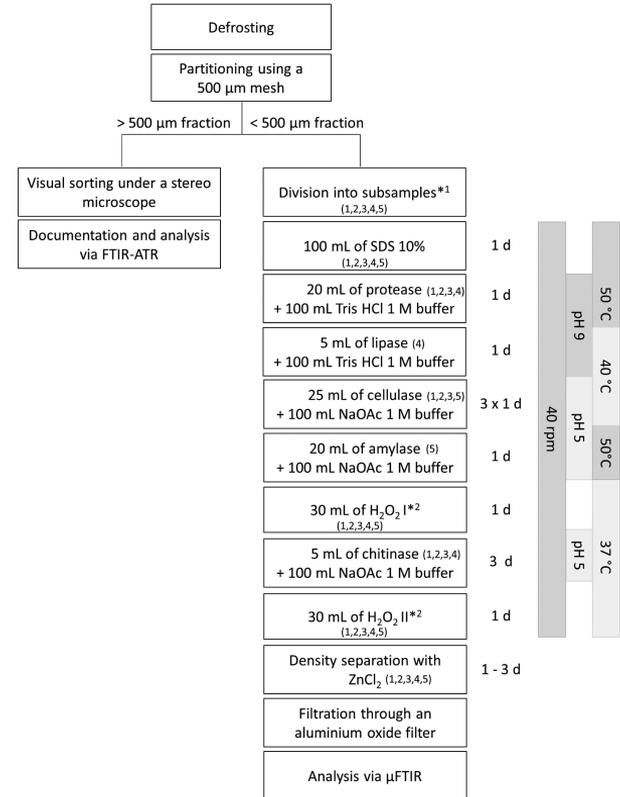
Sample treatment

- ▶ Degradation of organic matter
 - Chemical or enzymatic treatment



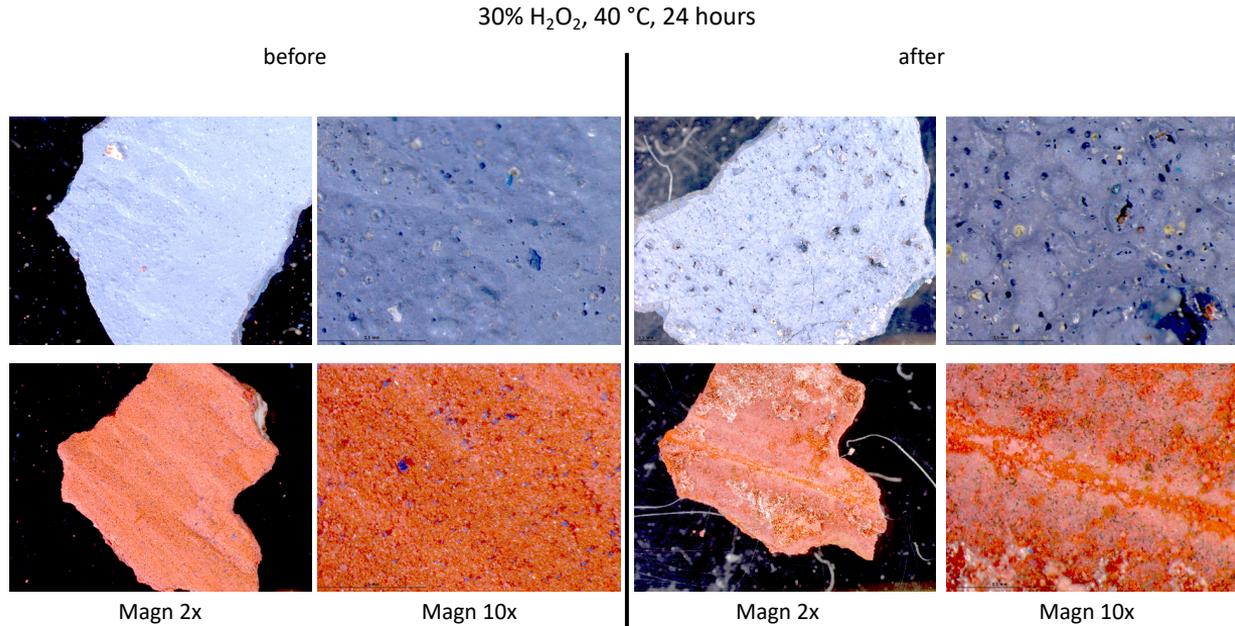
Sample treatment

- ▶ Degradation of organic matter
 - Chemical or enzymatic treatment



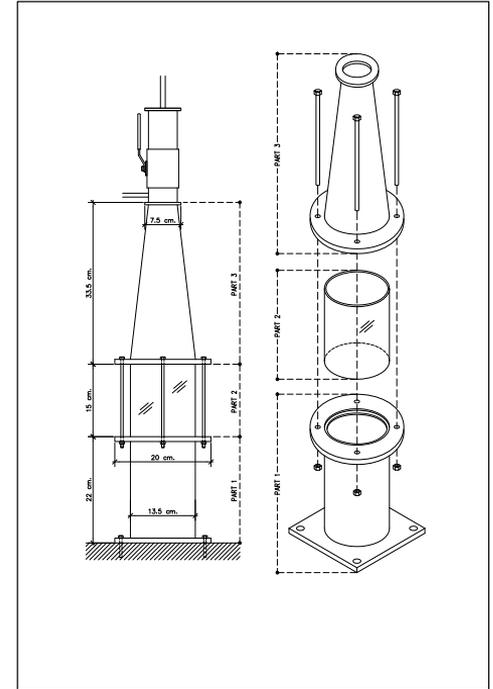
Sample treatment

- ▶ Degradation of organic matter
 - Chemical or enzymatic treatment



Sample treatment

- ▶ Degradation of organic matter
 - Chemical or enzymatic treatment
- ▶ Density separation
 - Density solution, NaCl, ZnCl...



Kristineberg Microplastic Separator
Modified from Munich Microplastic
Separator MPSS (Imhof et al., 2012)

Sample treatment

- ▶ Degradation of organic matter
 - Chemical or enzymatic treatment
- ▶ Density separation
 - Density solution, NaCl, ZnCl...
- ▶ Filtration
 - 300 μm , 100 μm , 30 μm , 10 μm , 1 μm ...



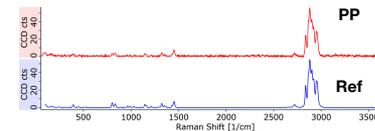
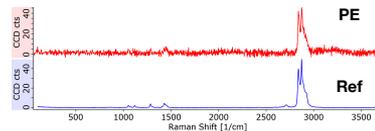
Characterization of Microplastics

▶ Visual properties

- Size, color, shape...

▶ Problems

- Time consuming
- Size limitations
- Up to 70 % of particles visually resemble Microplastics are not confirmed as plastics by spectroscopy*



*Hidalgo-Ruz et al 2012

Characterization of Microplastics

Visual properties

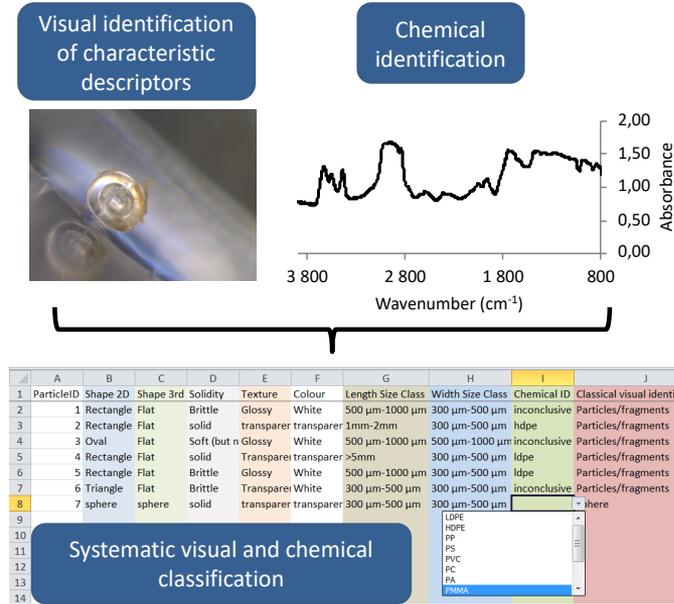
- Size, color, shape...

Problems

- Time consuming
- Size limitations
- Up to 70 % of particles visually resemble Microplastics are not confirmed as plastics by spectroscopy*

Chemical composition

- FTIR, Raman, mass spectroscopy



*Hidalgo-Ruz et al 2012

Correlative microscopy for particle identification



Light microscope



Scanning electron microscope SEM

In situ Raman microscope



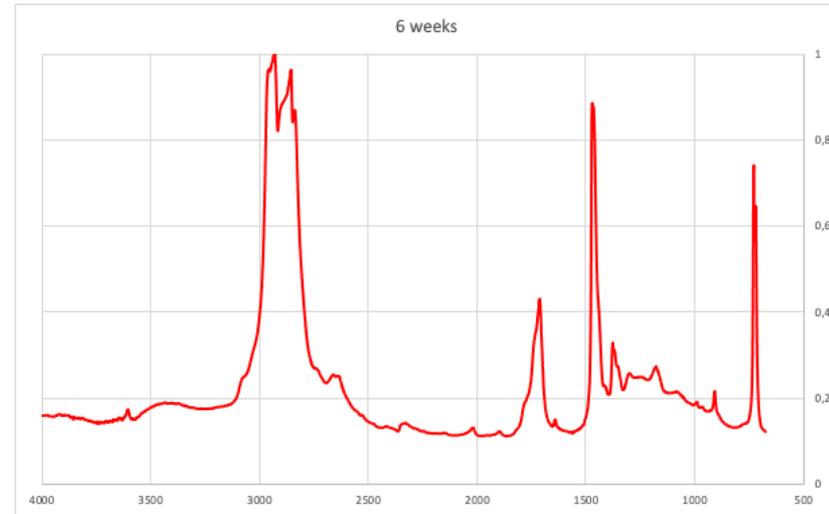
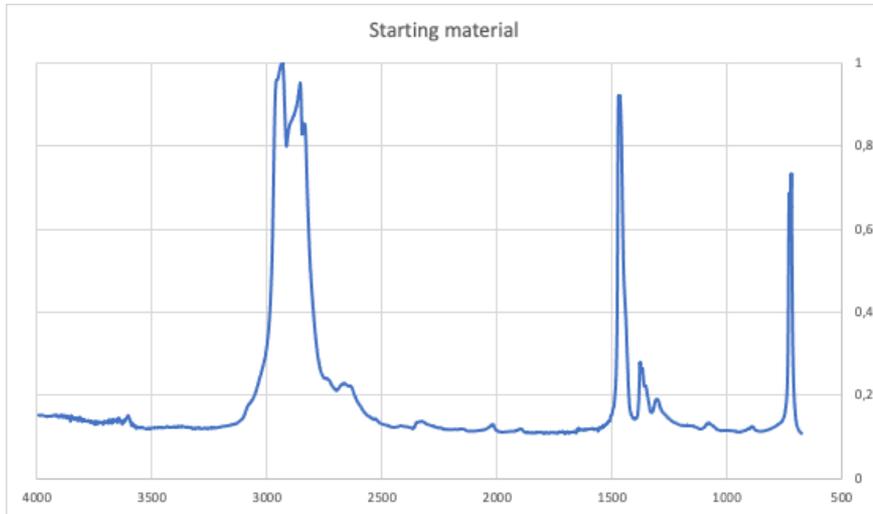
FTIR

FTIR

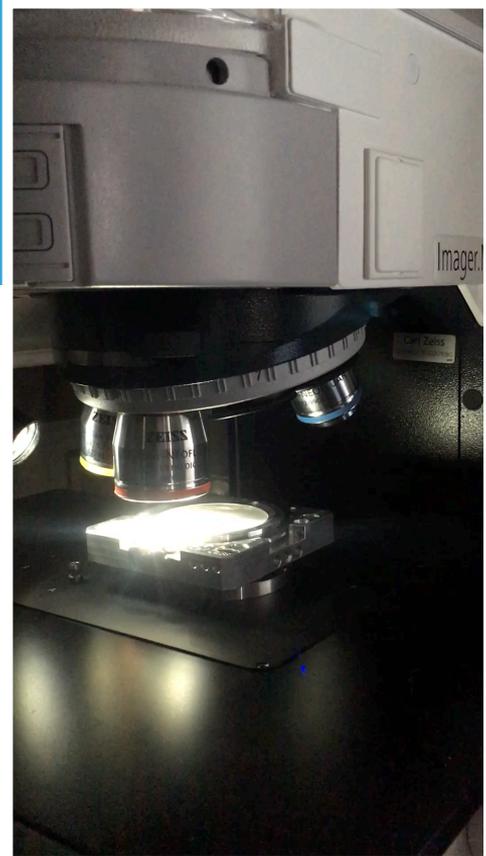
- Chemical fingerprint
- Size limitations
- Degradation



FTIR

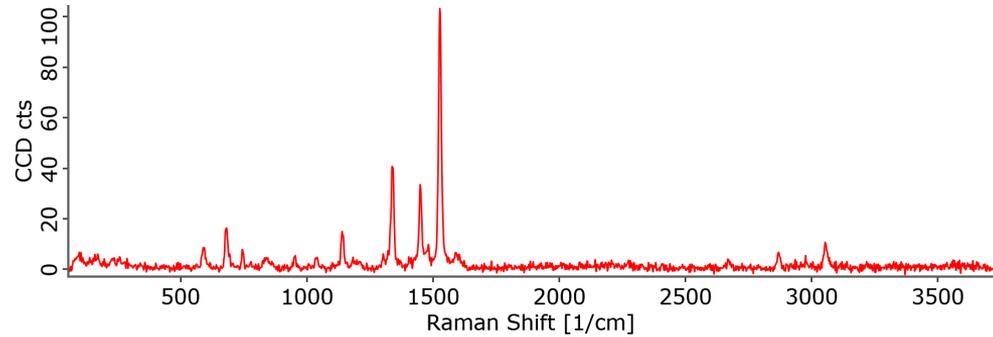


▶ LIGHT MICROSCOPE



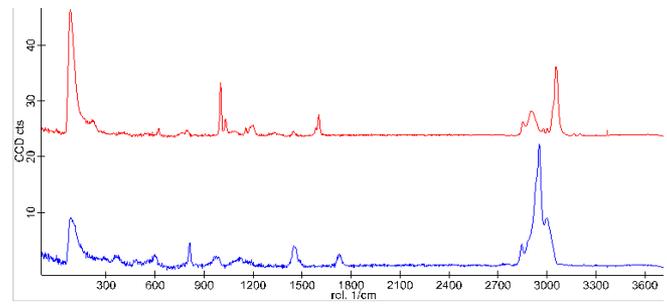
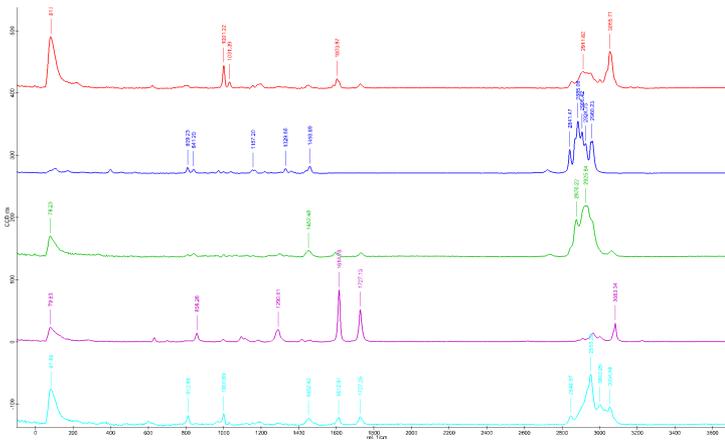
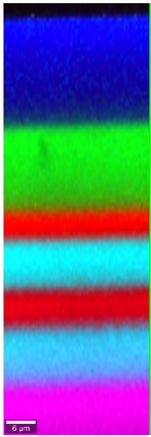
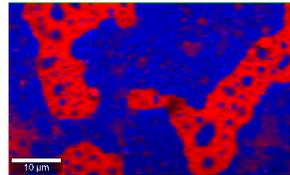
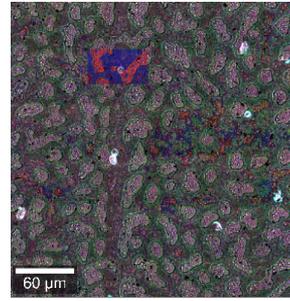
Raman microscopy

- Chemical fingerprint
- Smaller size
- Pigments

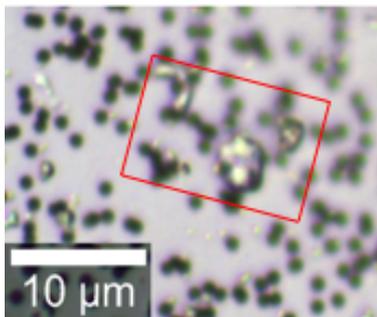


Raman microscopy

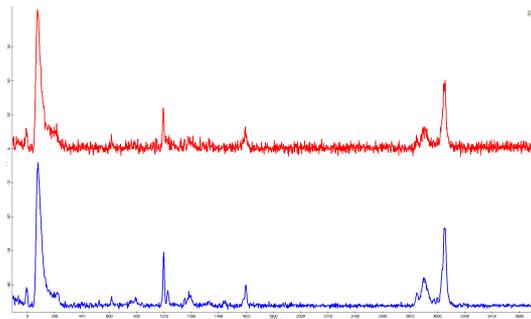
- Chemical fingerprint
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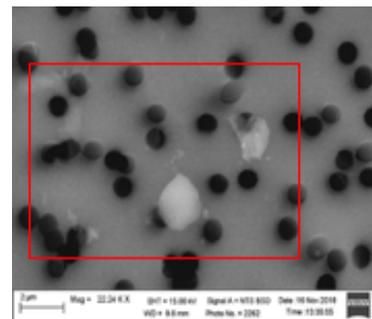
SEM-Raman



Confocal image



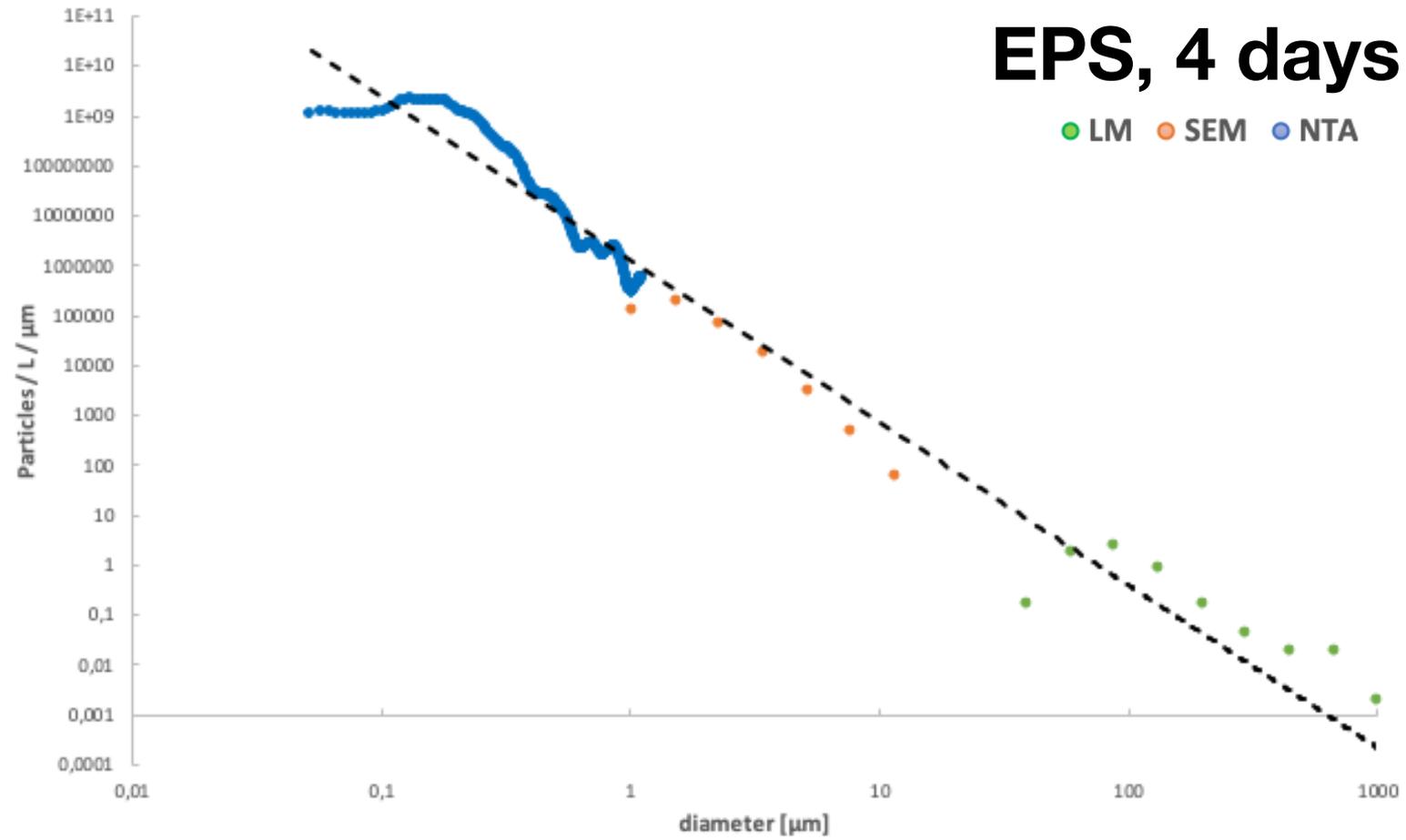
Raman spectra with reference spectra



SEM image

EPS, 4 days

● LM ● SEM ● NTA





THANK YOU

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