MICROPLASTIC DETECTION

ECSIN LAB RESEARCH AND METHODS VALIDATION

The vast array of different plastic types available on today's consumer market makes the qualitative or quantitative analysis of microplastics extremely challenging and there are no officially recognized methods available by now.

However thanks to **ECSIN LAB progress in scientific research**, **specific methods applicable to different matrix types** - including detergents, cosmetics, drinking water, milk, beverages, mineral salts, fish products and environmental matrices (e.g. waste water, soil, sludge) - were **developed and validated** through:

- Verification of process and possible contamination through blank analysis
- Recovery assessment of the number of microplastics added
- Assessment of the integrity (size and shape) of added microplastics
- Verification of chemical nature of added microplastics

VALIDATED PROCEDURES FOR

Salt
Drinking Water
Milk
Soft drinks
Mollusks
Fish

Waste water
Fresh water / Sea water
Sludge
Soils
Digestate

Detergents
Cosmetics

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MICROPLASTIC DETECTION
ECSIN LAB **ACCREDITATION**

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

ecsin
european center
for the sustainable impact
of nanotechnology

MICROPLASTIC DETECTION

ECSIN LAB **RESEARCH AND METHODS VALIDATION**

Sample **preparation**
STEP 1

The first step is the degradation of the organic matrix in order to isolate microplastics

LIQUID SAMPLES

SOLID SAMPLES

CHEMICAL AND/OR ENZYMATIC DIGESTION

ARTIFACT PREVENTION
- Alteration or particle loss
- External contamination

Filtration
STEP 2

Microplastics have to be completely recovered on filter and detectable.

FILTRATION

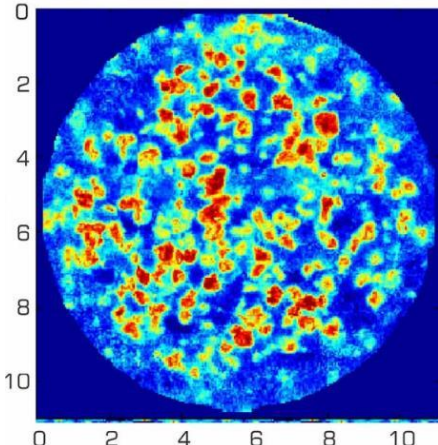
- Filtration in cleanroom ISO 7 class
- Plastic-free items
- Appropriate cleaning procedure before filtering

µFTIR / chemical imaging
STEP 3

µFTIR SAMPLING MODES
- Reflectance
- Transmittance
- ATR (attenuated total reflection)

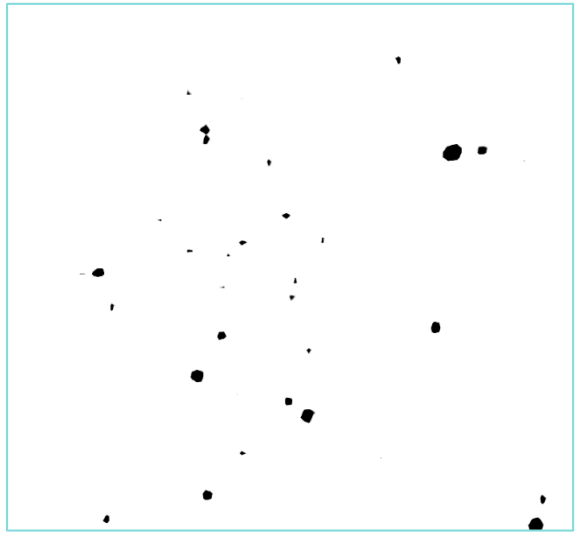
µFTIR / CHEMICAL IMAGING

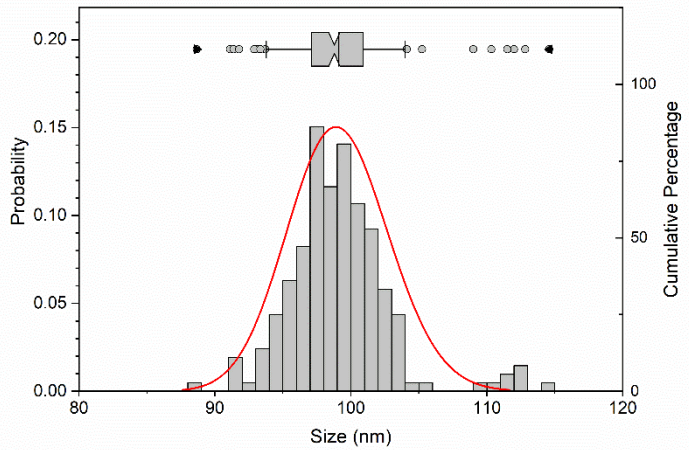
Analytical capability to create a **visual image of components distribution** from simultaneous chemical identification and particle size detection:
- Generate **chemical images** showing differences
- Each **pixel corresponds** to IR spectrum



MICROPLASTIC DETECTION
FILTRATION STEP

Matrix degradation without affecting **MICROPLASTICS**, both in size and composition.





SIZE DISTRIBUTION PARAMETERS	
Number of particles	206
Minimum diameter (µm)	89
First quartile (µm)	97
Median (µm)	99
MAD (µm)	4
Average (µm)	99
Standard deviation (µm)	4
Third quartile (µm)	101
Maximum diameter (µm)	115

MICROPLASTICS have to be completely recovered on filter.

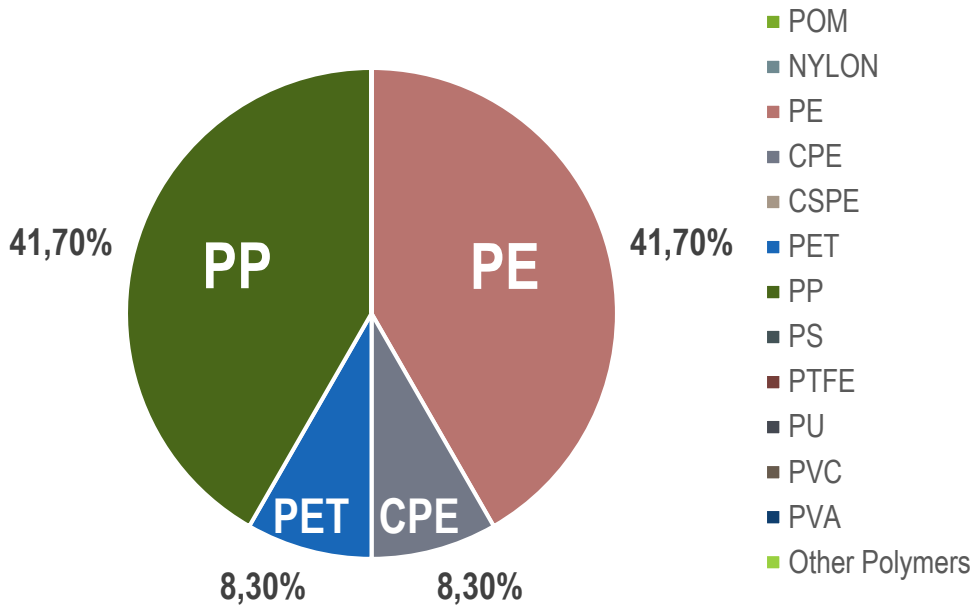
		SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5	SAMPLE 6
Polyethylene (10-106 µM)	Number of spiked mps in sample	**335**	**834**	**355**	**416**	**671**	**631**
	Recovery in number	**289**	**844**	**408**	**446**	**700**	**587**
	RECOVERY %	**86%**	**101%**	**115%**	**107%**	**104%**	**93%**

Case study

MICROPLASTICS DETECTION **IN CRUSTACEANS**

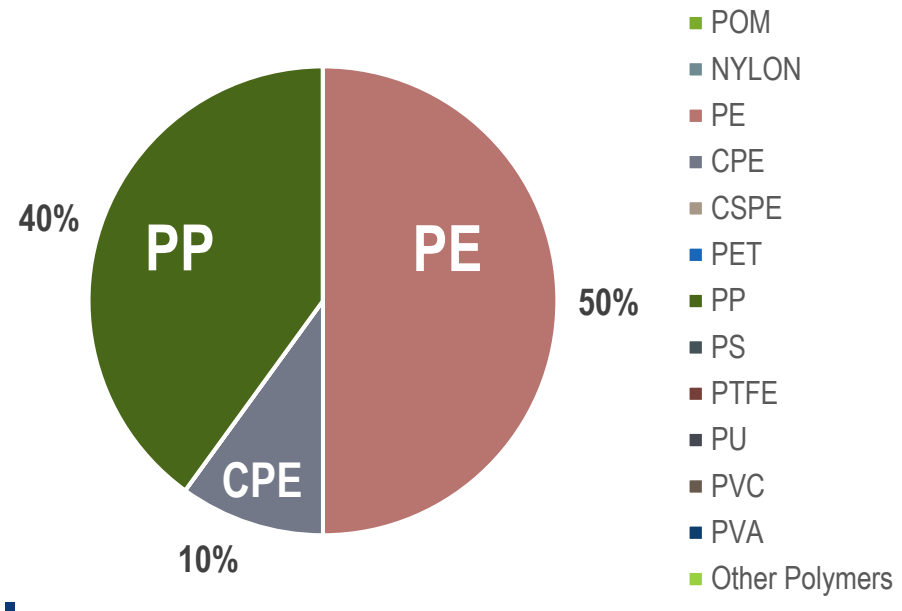
Crustaceans: flagship species for deep-sea environments.

Analyzed **crustaceans present microplastics particles in the size range 36 – 2556 µm.** Particles are mainly composed of **polyethylene (PE) and polipropilene (PP)**. A second analysis examined particles smaller than 150 µm that identify microplastics in the size range of in the size range 36 – 132 µm.



CRUSTACEANS: 12 particles / g

SIZE RANGE: 36 – 2556 µm



CRUSTACEANS: 10 particles / g

SIZE RANGE: 36 – 132 µm

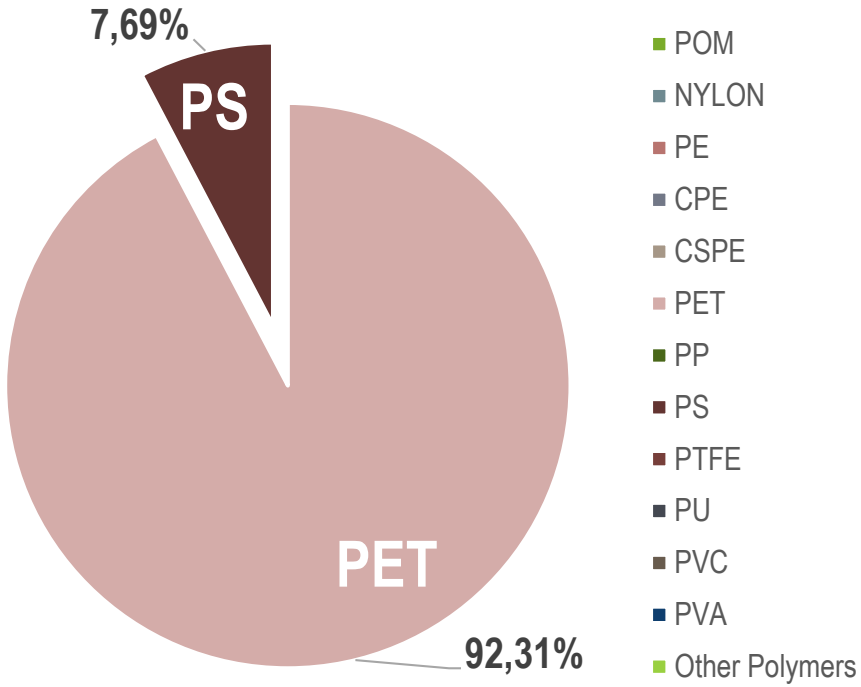
CASE STUDY

Case study

MICROPLASTICS DETECTION **IN TOMATO**

SUPPLY CHAIN CONTAMINATION

Analyzed **tomato present microplastics particles in the size range 33 – 200 µm.** Particles are mainly composed of **polyethylene terephthalate (PET).** A second analysis examined particles smaller than 150 µm that identify microplastics in the size range of in the size range 33 – 130 µm.

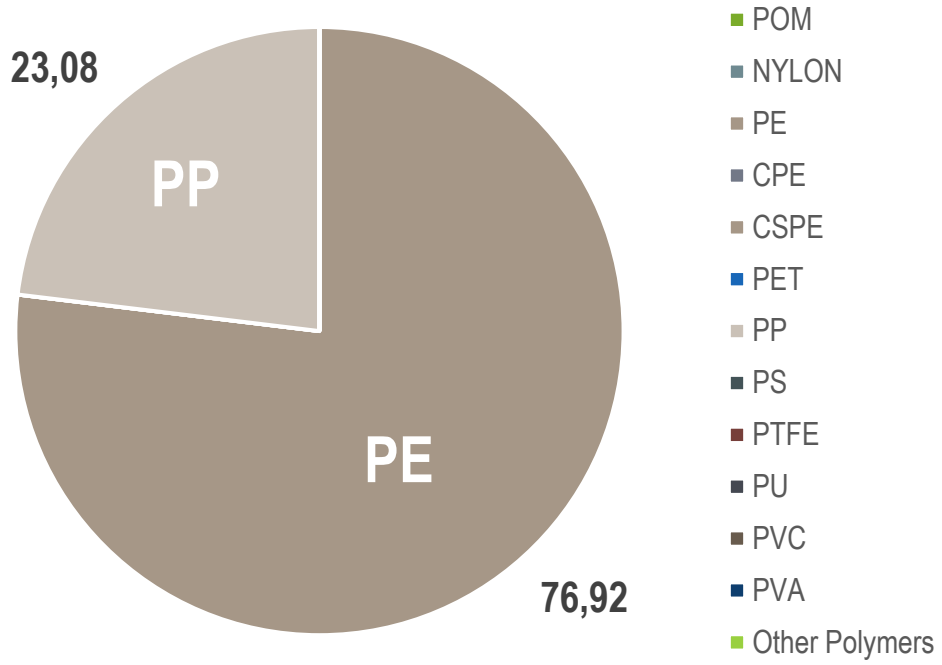


Case study

MICROPLASTICS DETECTION **IN SOAP CUBE**

POST-PROCESS CONTAMINATION

Analyzed **soap cube present microplastics particles in the size range 37 – 139 µm.** Particles are mainly composed of **polyethylene (PE).**



CASE STUDY