Federation of European Microbiological Societies

FEMS ONLINE Conference on Microbiology 2020

in association with the Serbian Society of Microbiology

PLASTIC SAGA – THE MICROBES STRIKE BACK

Marija Mojicevic

Institiúid Teicneolaíochta Bhaile Átha Luain
Athlone Institute of Technology

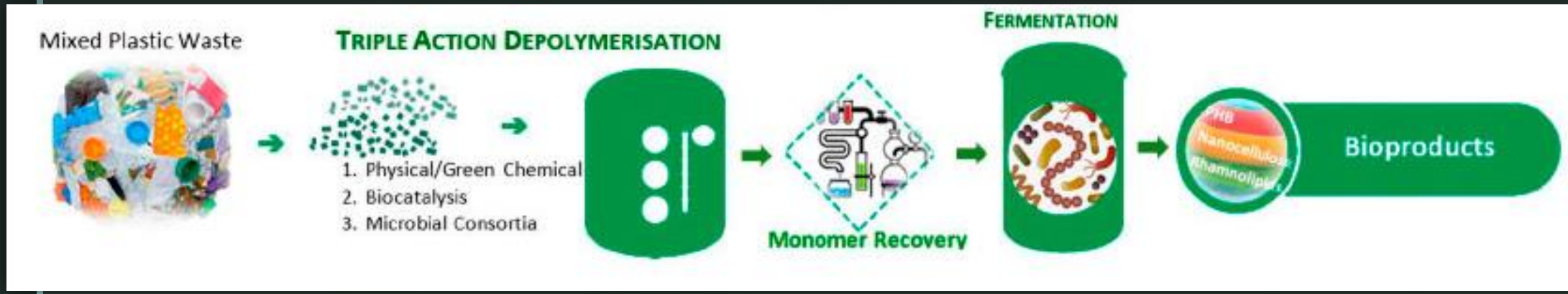
BioICEP

SUBSCRIBE TO BIOICEP'S NEWSLETTER

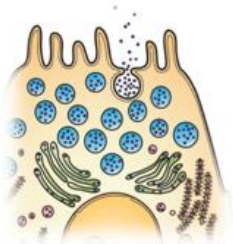
GOALS

The project's overall objective is to demonstrate a seamless sustainable route to a circular economy for plastics by developing an advanced energy, carbon, and cost-efficient waste plastic biotransformation into high market demand bioproducts and bioplastics.


BioICEP
Bio-Innovation of a Circular Economy for Plastics
AIT
Avecom
TU Clausthal
LIT
BELGIUM
microlife solutions
IRELAND
GERMANY
NETHERLANDS
SERBIA
CHINA
PORTUGAL
SPAIN
GREECE
Logoplaste
acteco
National Technical University of Athens
iBET
AIMPLAS
A SUSTAINABLE WAY
TO A BETTER WORLD

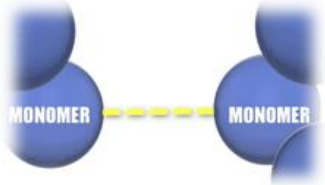


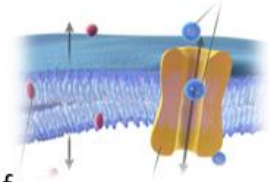
Pretreatment



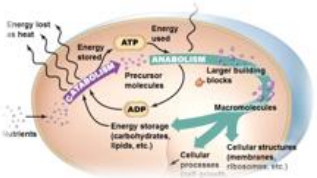
Microbial production of extracellular enzymes

Break down of long polymer chains into monomers and oligomers (Bio-fragmentation)





Monomers penetration of the cells



Monomers inclusion in metabolic pathways (biomass and/or metabolites production)

BioICEP

Pretreatment technology

Necessity

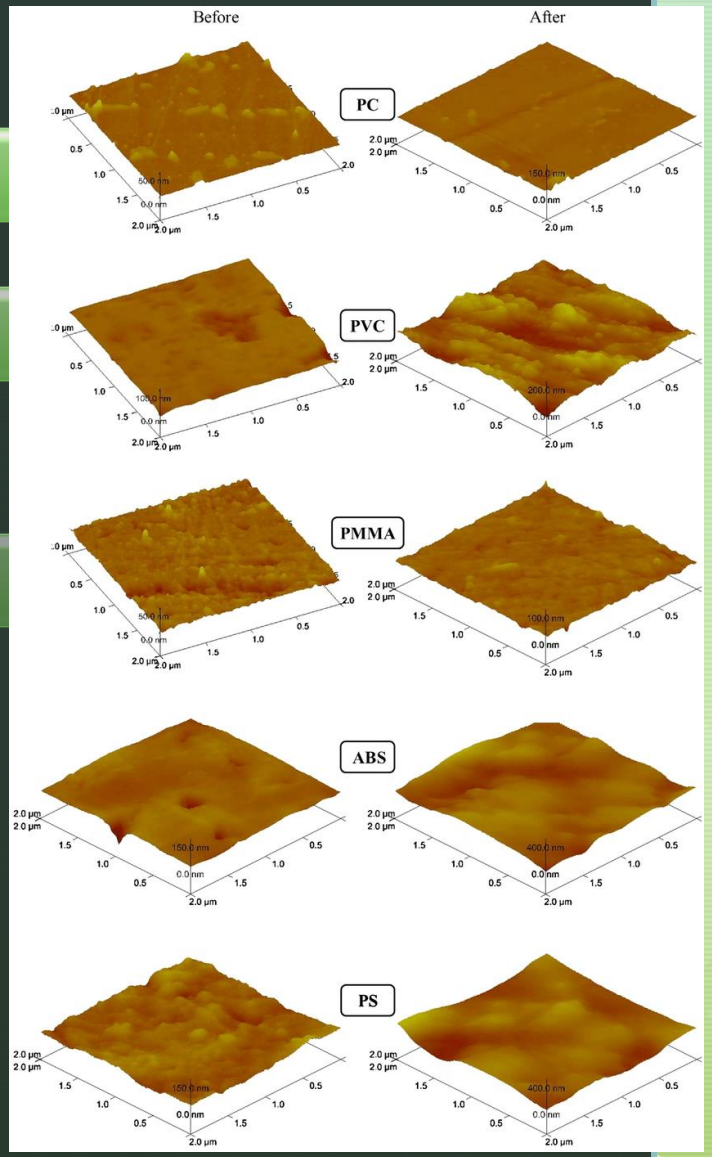
- Plastic waste is more accessible for microbial degradation

Types

- Physical
- Chemical
- Photo pretreatment methods

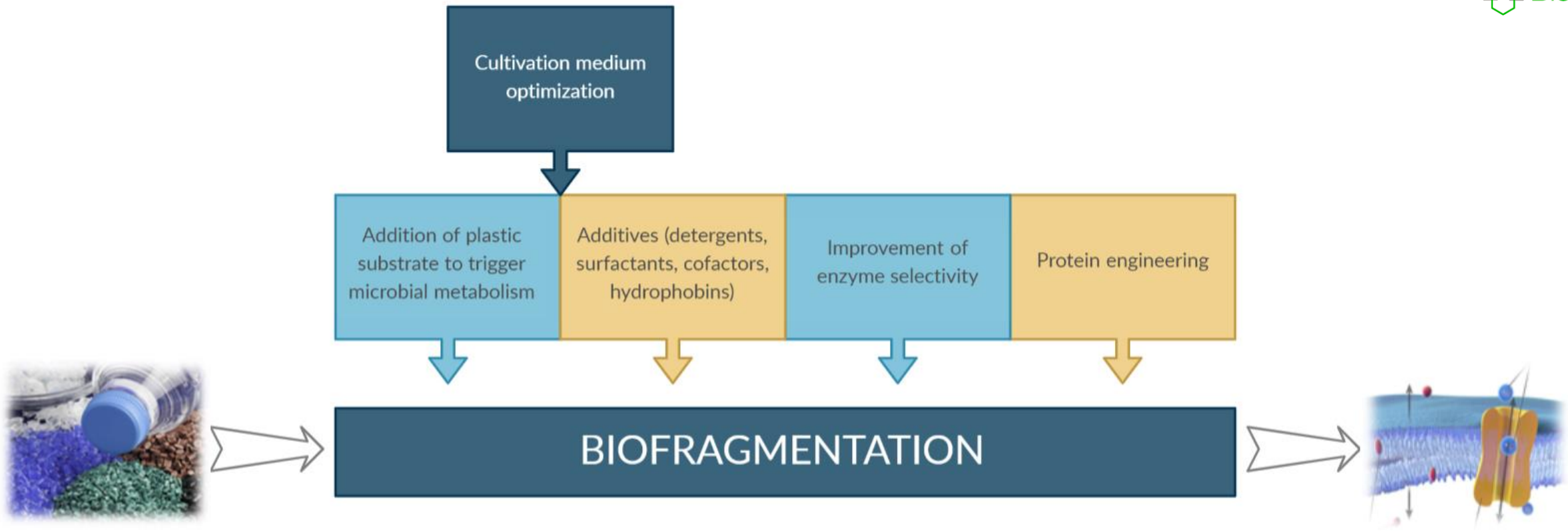
Function

- Size reduction
- Reducing molecular weight
- Increasing surface area
- Decreasing crystallinity/increasing amorphous regions
- Increasing porosity
- Functional groups modification
- Producing chain scissions



10.1016/j.jhazmat.2016.09.014

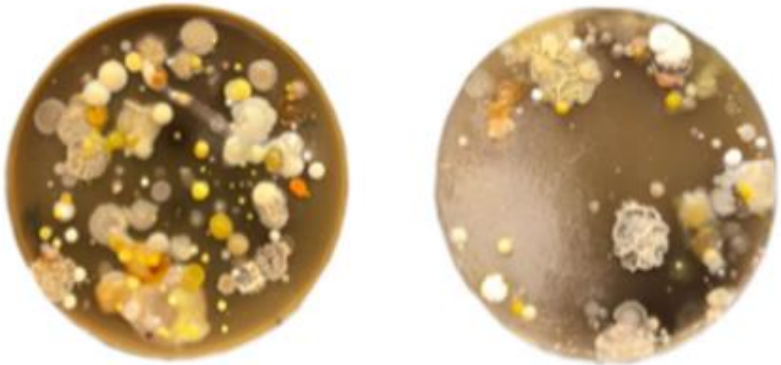
Improving biofragmentation



UP TO DATE WORK

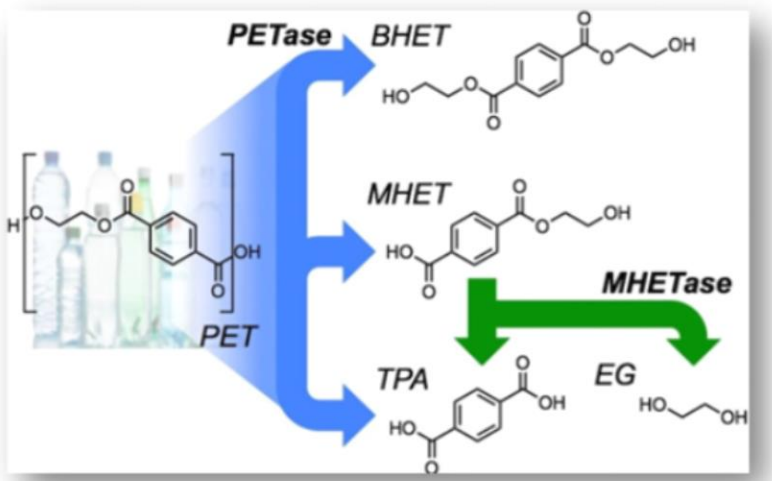
Sampling:
Landfills
Pristine forests

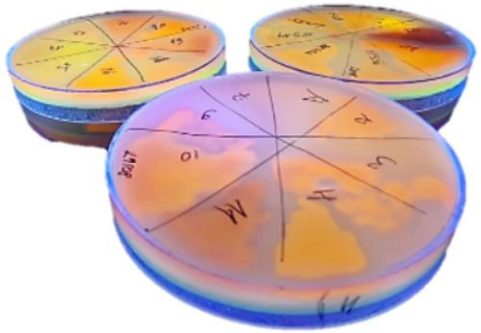
Microbial isolation:
MSF/LA/ISP2

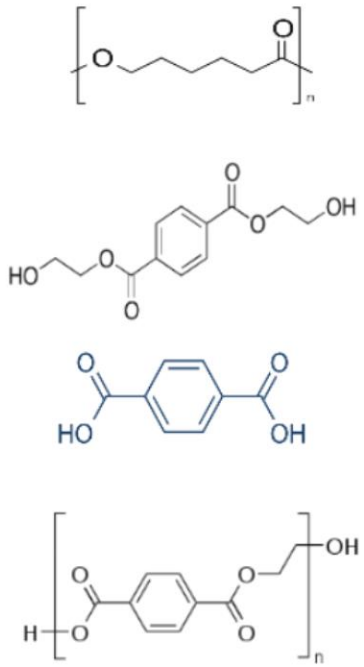


Obtaining pure cultures

POTENTIAL OF ISOLATES TO DEGRADE PLASTICS







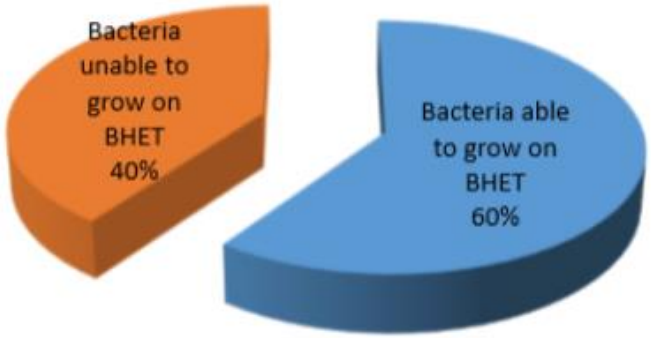
BioICEP

Landfills vs pristine soil

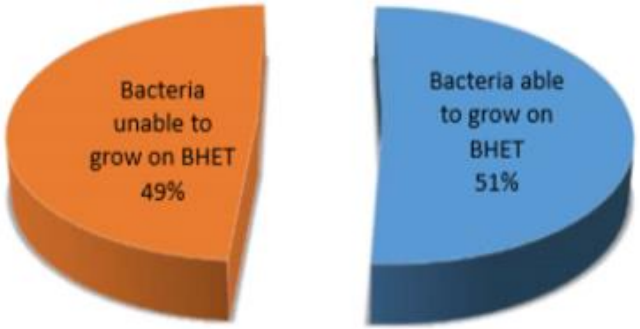
Soil sample with plastic buried 30 years ago

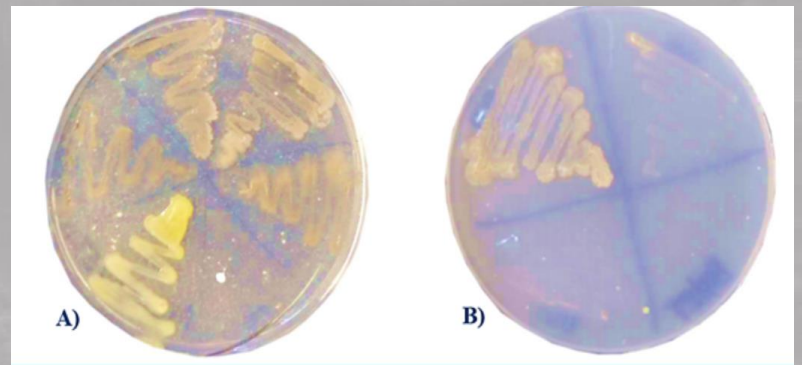
Isopoda

Bacterial isolates from contaminated soil



Bacterial isolates from pristine soil





PCL

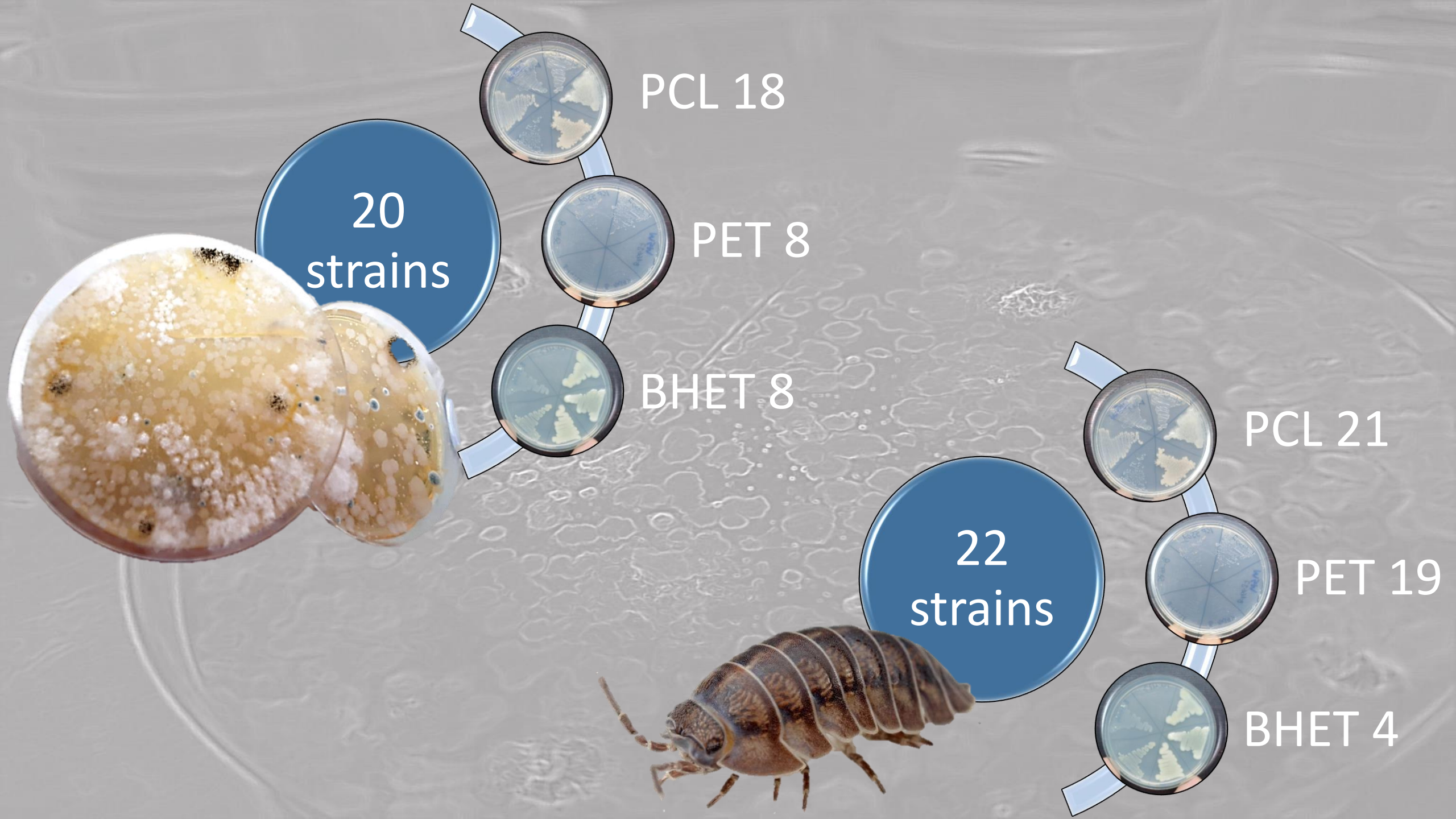
4/5

TA

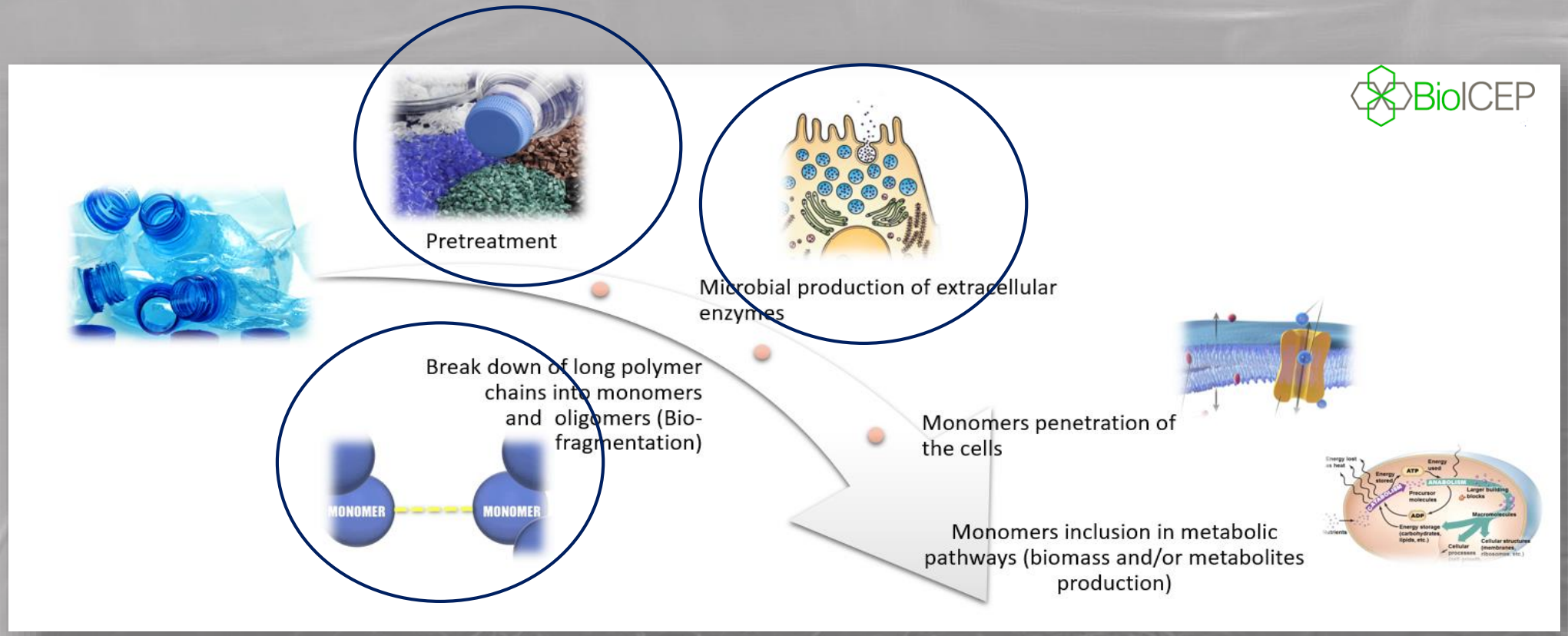
1/5

PET

5/5


20 strains
PCL 18
PET 8
BHET 8
22 strains
PCL 21
PET 19
BHET 4

FUTURE WORK

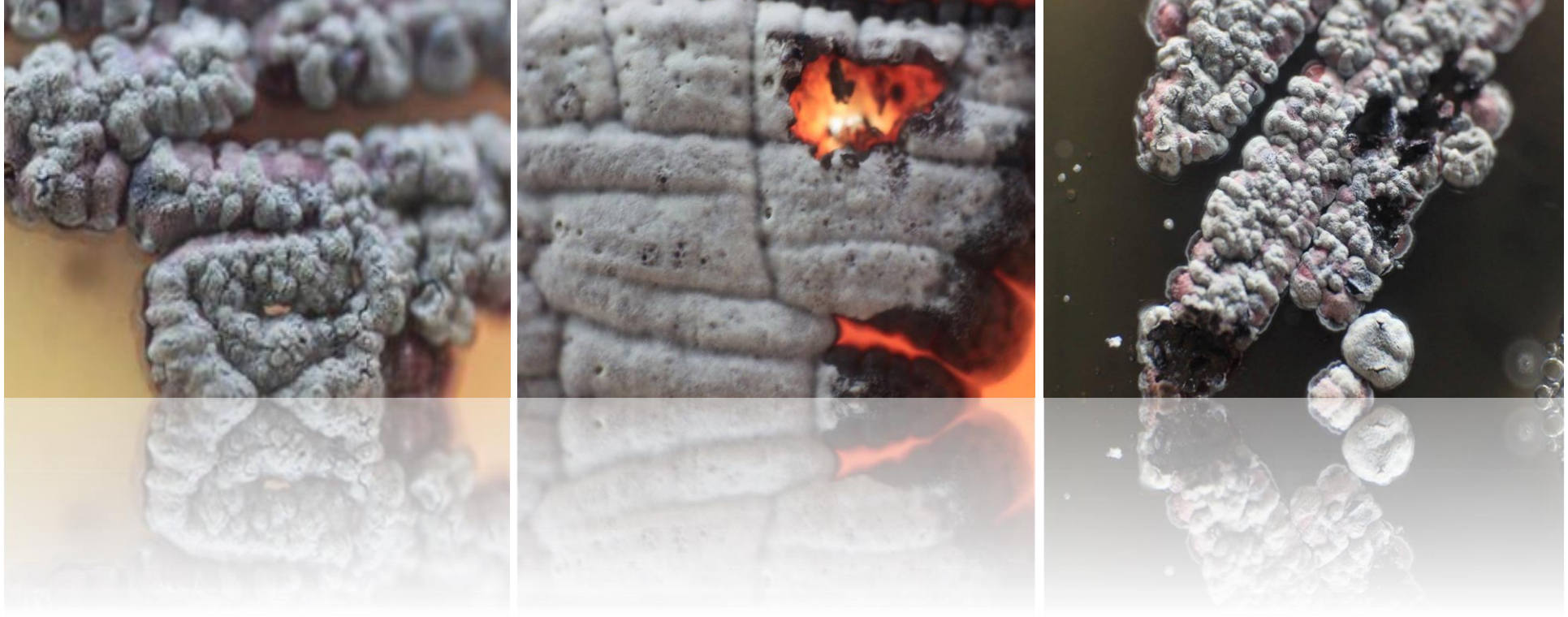


Pretreatmant

- Ultrasound irradiation
- Ionic Liquid Solvents

Microbial production

- Novel strains isolation
- Medium optimization
- Conditions optimization



Thank you for your attention!

MARIJA MOJICEVIC

mmojicevic@ait.ie

BioICEP

AIT