



MINISTRY OF RESEARCH,  
INNOVATION AND DIGITIZATION

uefiscdi  
Executive Agency for Higher  
Education, Research, Development  
and Innovation Funding

NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT  
FOR INDUSTRIAL ECOLOGY  
**ECOIND**  
EXCELLENCE IN RESEARCH AND ENVIRONMENTAL SERVICES  
National Research and  
Development Institute for  
Industrial Ecology-ECOIND

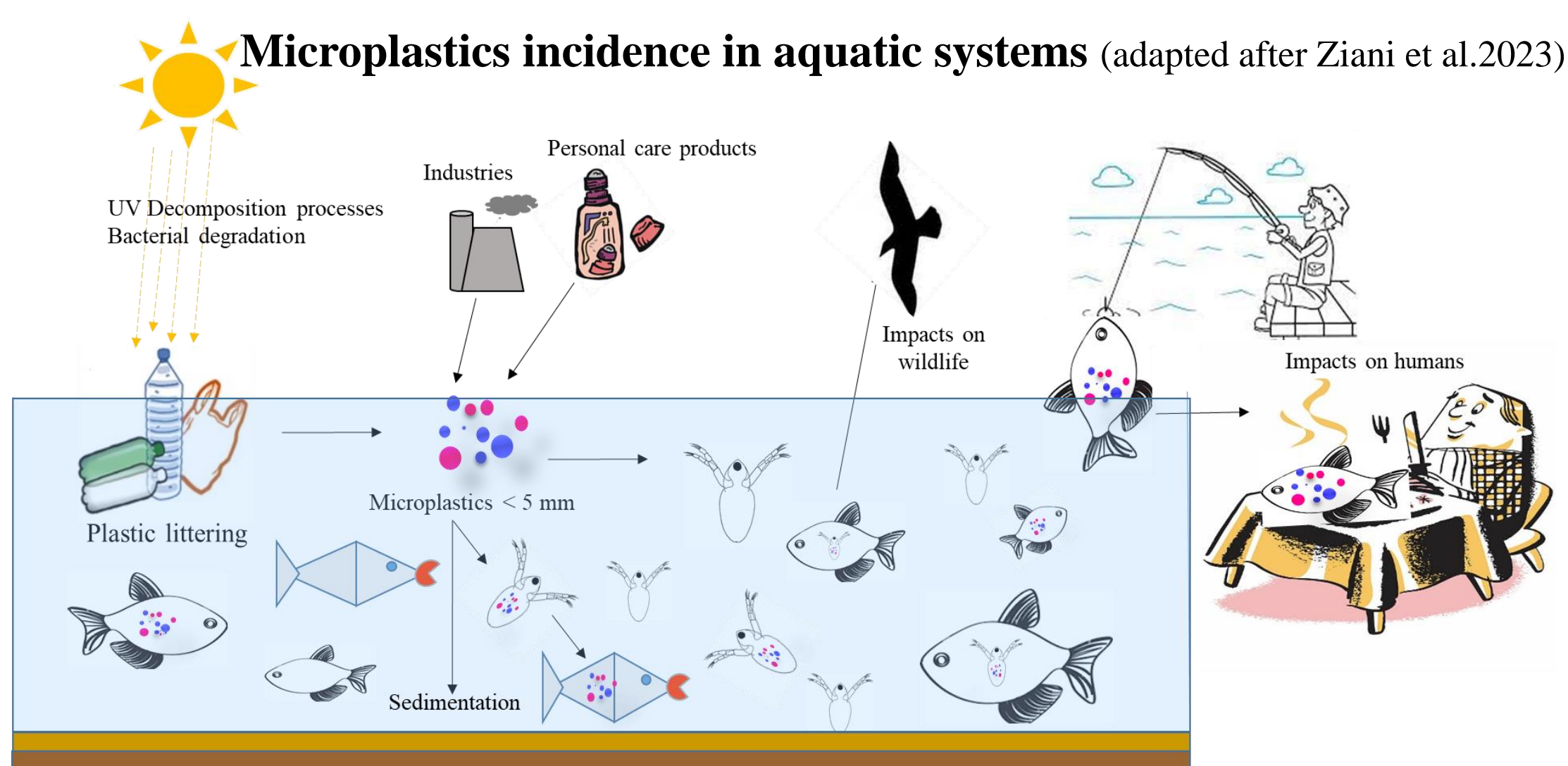
## Monitoring the microplastics impact on *Cyprinus carpio* by biomarkers expression at translational level

**Cătălina Stoica, Stefania Gheorghe, Alina Roxana Banciu, Mihai Niță-Lazar\***

National Research and Development Institute for Industrial Ecology - ECOIND, 57-73 Drumul Podu Dambovitei,  
Bucharest, 060652, Romania

### Introduction

Nowadays, aquatic environment contamination with microplastics has become a major global challenge of society. As most of pollutants, microplastics release into the aquatic ecosystems could have harmful effects on living organisms at all trophic levels.

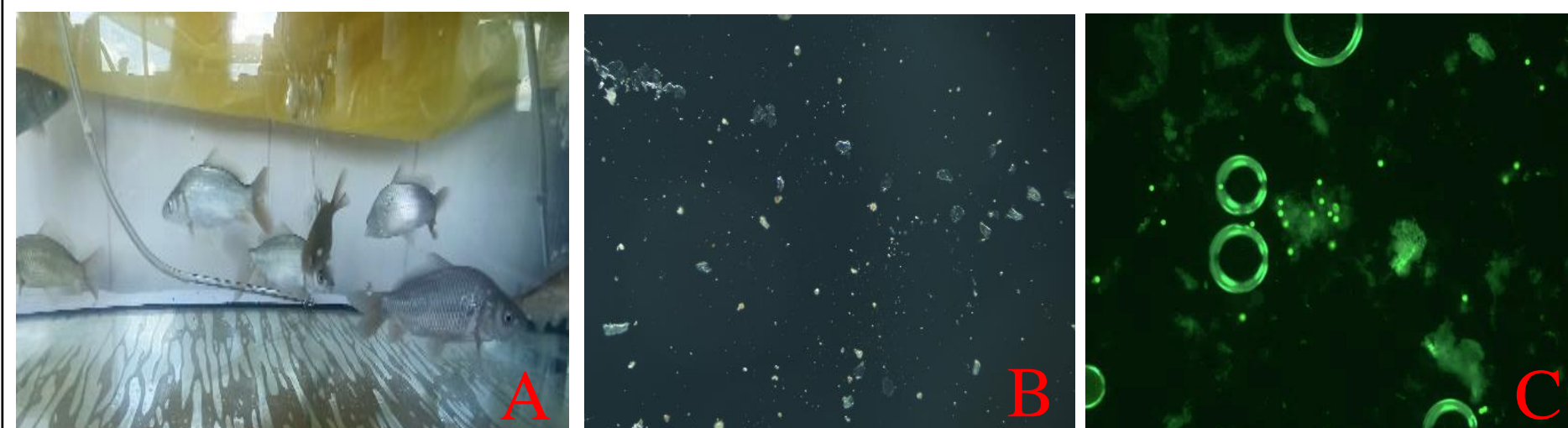


This paper points out the effects of polyethylene (PE) (40,48 and 125  $\mu\text{m}$ ) and a mixture of polystyrene (PS) (20, 200 and 430  $\mu\text{m}$ ) on common carp after 75 days exposure by analyzing their protein profile.

### Results and conclusions

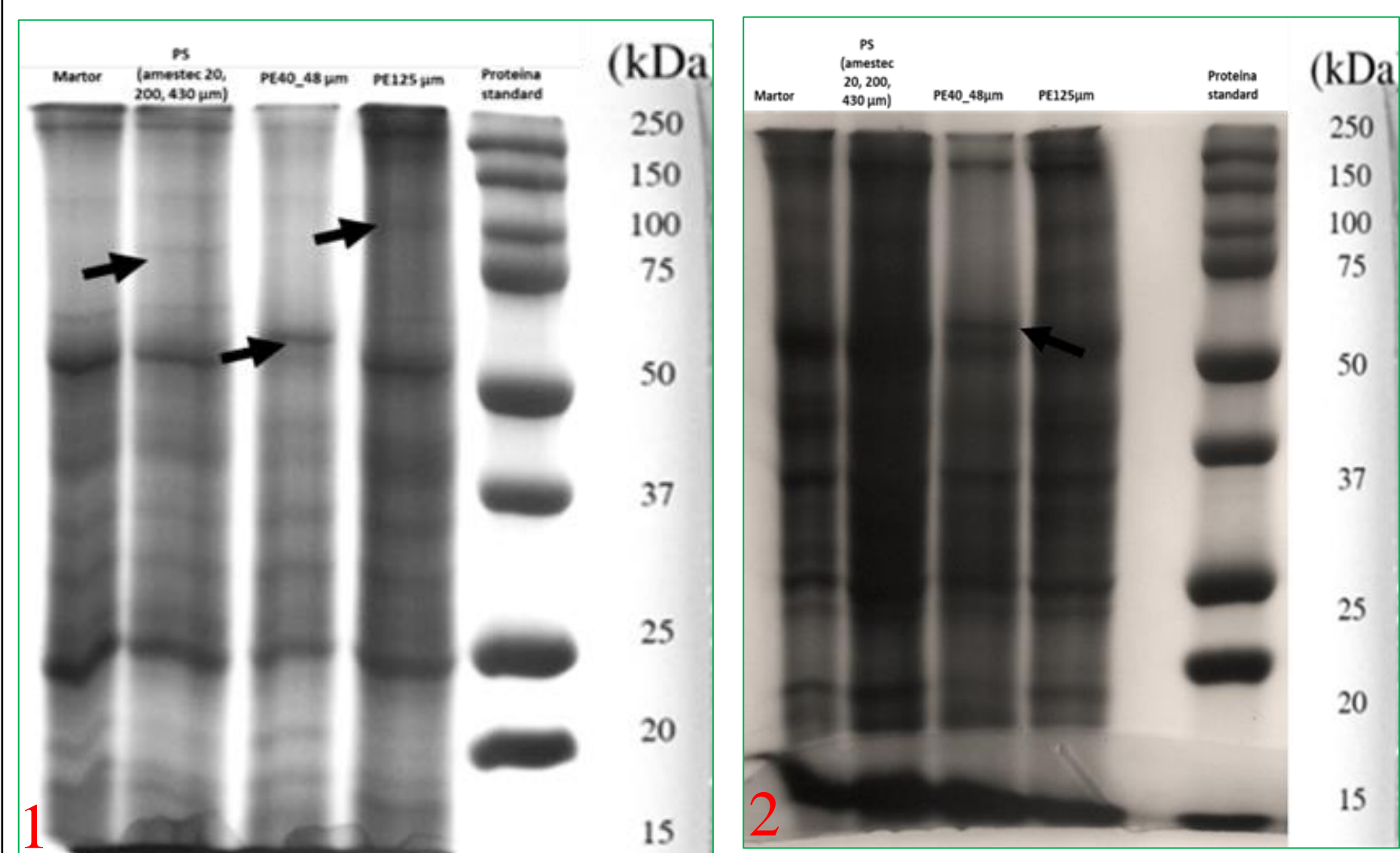
No mortality or behavior changes were recorded during experimental chronic exposure period.

*Cyprinus carpio* in test solution (A); microscopic analysis of tested PE (B) and PS (C).



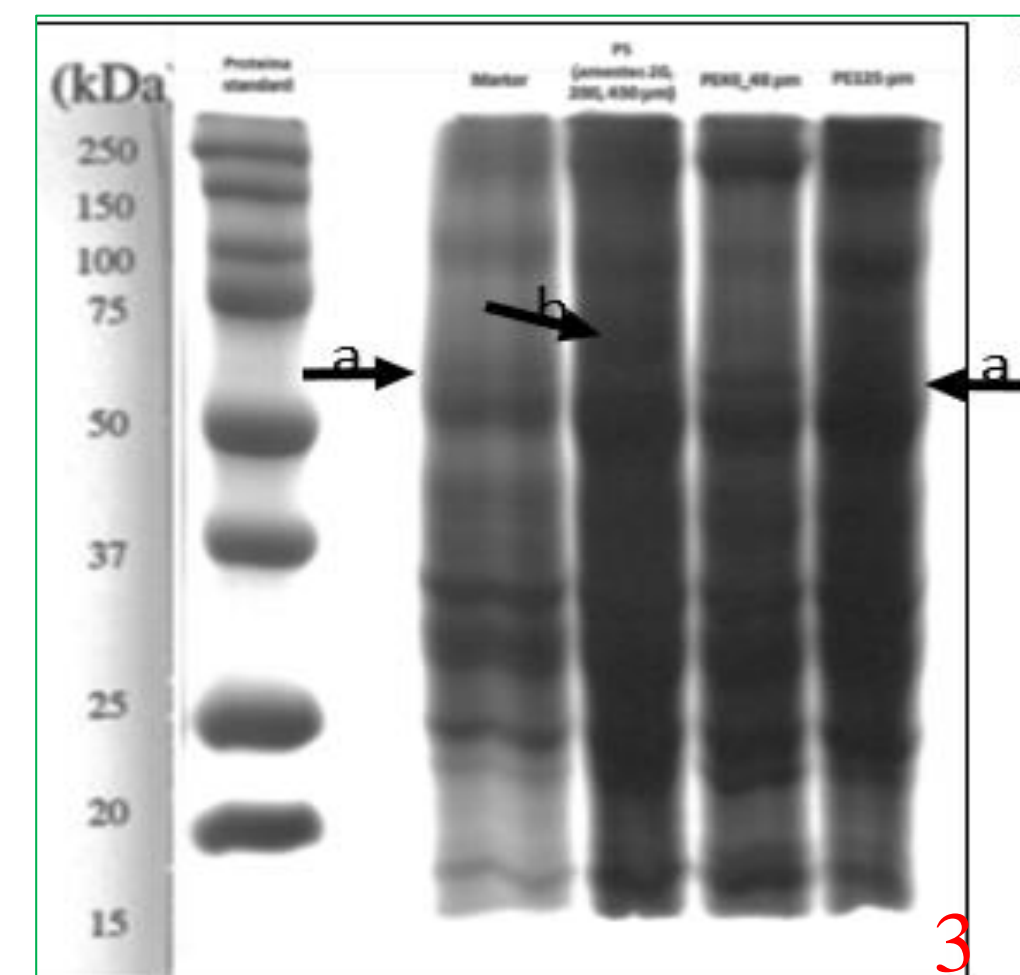
The results showed that PS, PE of 40-48  $\mu\text{m}$  and PE of 125  $\mu\text{m}$  induced in carp gills the expression of 85 kDa, 60 kDa and 10 kDa proteins (1).

Protein profile of fish gills (1) and intestine (2) after 75 days MPs exposure.



Protein profile of fish liver after 75 days MPs exposure (3)

PE of 40-48  $\mu\text{m}$  induced protein expression of 60 kDa in fish intestine samples (2), as in case of gills, while PS generated a different profile in liver, especially of 65 kDa proteins (3).



In this case, the liver proved to have increased resilience to microplastics, which is consistent with its role as a detoxifier. Overall, could modulate specific protein expression linked to different fish organs.

### Materials and methods

#### Test conditions of chronic test method

*Cyprinus carpio* (common carp), age >2years  
No replicates – 10 per each test and control  
68.63±10 g/ individual; 15.9±1 cm / individual  
Daily feeding with commercial feed 1% of the lot weight

Semi-static system – solution replacement every 48 hours  
Test duration: 75 days  
Temperature 18-25°C / light exposure 12-16 h/days  
Control: dilution water  
Volume of test solution: 80 L / test and control

PE 40-48  $\mu\text{m}$ , 125  $\mu\text{m}$  (c=0.6 mg/L for each size, density=200 PE 40-48  $\mu\text{m}/\text{L}$ , 50 PE 125  $\mu\text{m}/\text{L}$ )  
PS 20, 200, 430  $\mu\text{m}$  Red Nile marked (c=1.2 mg PS/L, cca.0.4mg/L for each size; density=10<sup>3</sup>-1.5x10<sup>3</sup> PS 20  $\mu\text{m}/\text{L}$ ; 10<sup>2</sup>-1.5x10<sup>2</sup> PS 200  $\mu\text{m}/\text{L}$ ; 10-15PS 430  $\mu\text{m}/\text{L}$ )  
MPs were added in test solution each 48h with food

Endpoint:  
Modifications of translational biomarkers expression

Chronic test OECD 305

### Acknowledgement

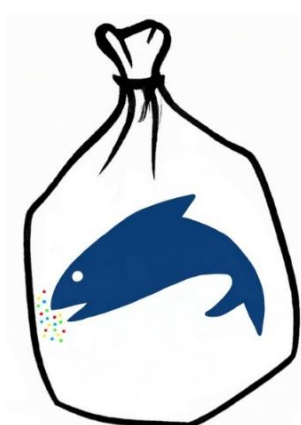
This work was supported by a grant of the Ministry of Research, Innovation and Digitalization, CNCS-UEFISCDI, project number PN-III-P1-1.1-TE-2021-0073, within PNCDI III. The authors acknowledge as well the project PN 23 22 02 01, contract no. 3N/2022 within Nucleu Programme supported by Romanian Ministry of Research, Innovation and Digitalization.



NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE  
FOR INDUSTRIAL ECOLOGY  
**ECOIND**  
EXCELLENCE IN RESEARCH AND ENVIRONMENTAL SERVICES

**Mihai NIȚĂ-LAZĂR, Ph.D.**  
Head of Bioteists - Biological Analysis

Phone: +4021 410.03.77 ext. 242; 57-73, Drumul Podu Dâmbovitei,  
Mobile: +40725.919.747 District 6, Bucharest, 060652  
e-mail: mihai.nita@incdecoind.ro www.incdecoind.ro



Microplasticfish - roject logo credit  
© Maria Alexandra Geanta