

## Supporting information

### **Transformations, interaction, and acute biological response of nanoplastics on mixotrophic microalgae *Peteriochromonas Malhamensis***

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## 1. Composition of Lake Geneva water

**Table S1.** Composition of Lake Geneva water (pH 8.05±0.1, Cond.288±1µS/cm) used in this study

Compounds	Concentration	Compounds	Concentration
Ca <sup>2+</sup>	1.03µM	HCO <sub>3</sub> <sup>-</sup>	1.41µM
Mg <sup>2+</sup>	0.24µM	SO <sub>4</sub> <sup>2-</sup>	0.55µM
K <sup>+</sup>	0.04µM	PO <sub>4</sub> <sup>3-</sup>	0.32nM
Na <sup>+</sup>	0.30µM	Cl <sup>-</sup>	0.26µM
DOC	0.96mg		

## 2. Composition of Culture medium

**Table S2.** Composition of culture medium (pH 7.03 ± 0.1, Cond.672±1µS/cm) used in this study

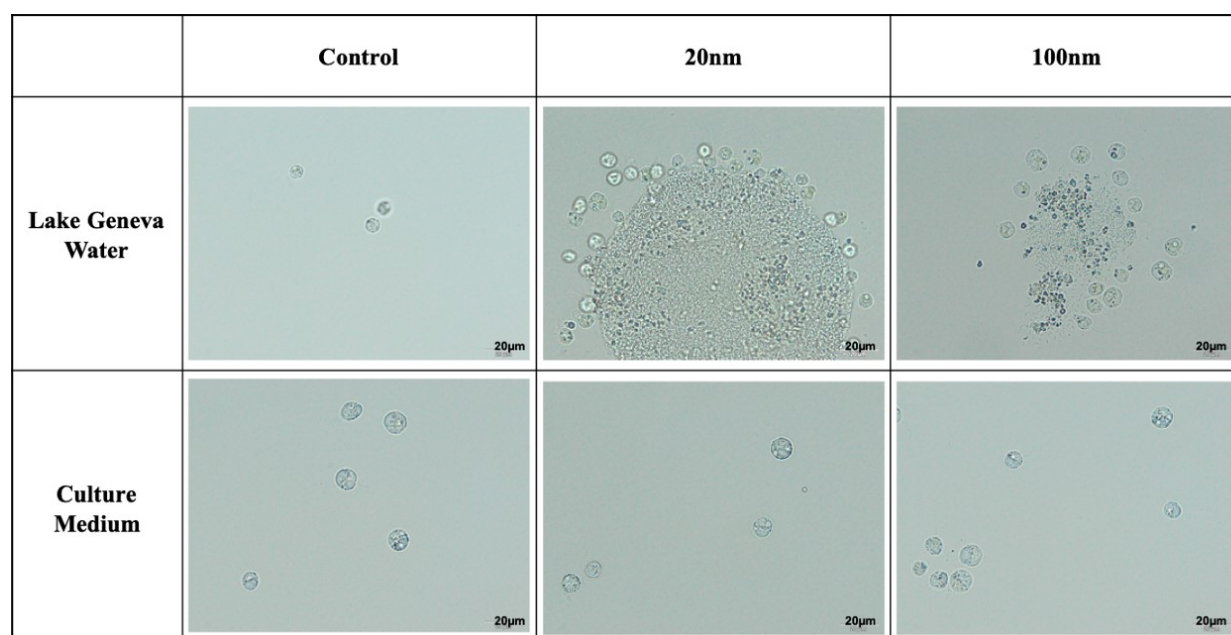
Compounds	Concentration	Compounds	Concentration
KNO <sub>3</sub>	1.0mM	Na <sub>2</sub> EDTA.2H <sub>2</sub> O	8.06µM
MgSO <sub>4</sub> .7H <sub>2</sub> O	81µM	FeSO <sub>4</sub> .7H <sub>2</sub> O	17.9µM
(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub>	0.15mM	MnCl <sub>2</sub> .4H <sub>2</sub> O	0.73nM
Ca (NO <sub>3</sub> ).4H <sub>2</sub> O	0.42mM	ZnSO <sub>4</sub> .7H <sub>2</sub> O	73nM
HEPES	1mM	CoCl <sub>2</sub> .6H <sub>2</sub> O	16.8nM
H <sub>3</sub> BO <sub>3</sub>	18.43µM	Vitamin B <sub>12</sub>	0.15nM
Na <sub>2</sub> SiO <sub>3</sub> .9H <sub>2</sub> O	0.5mM	Thiamine. HCl	300nM
Yeast extract	0.05%	Biotin	4.1nM
Glucose	0.05%	Niacinamide	0.8nM
Beef extract	0.05%	Peptone	0.4%

### 3. Two-way ANOVA with the factors of concentration and size

**Table S3.** Cell inhibition, cell counting, chlorophyll a content, ROS production, PI and cellular uptake by Two-way ANOVA with factors of concentration and size

Two-way ANOVA	Concentration		Size		Concentration*Size	
	Lake	Culture	Lake	Culture	Lake	Culture
Cell count	**	**	**	*	***	*
Chlorophyll a	****	ns	**	ns	***	ns
ROS	**	ns	*	ns	**	**
PI	ns	ns	ns	ns	*	ns
Uptake	*	****	**	**	*	*

### 4. Microscope observations of PS-NPLs on *P.malhamensis*. (Lake Geneva water and Culture medium)



**Fig S1.** Microscope images of PS-NPLs on *P.malhamensis* in Lake Geneva water and in culture medium at 24h. Scale bars: 20µm.

## 5. correlation analysis based on 12 keys parameters between the surface properties and biological response of the tested PS-NPLs

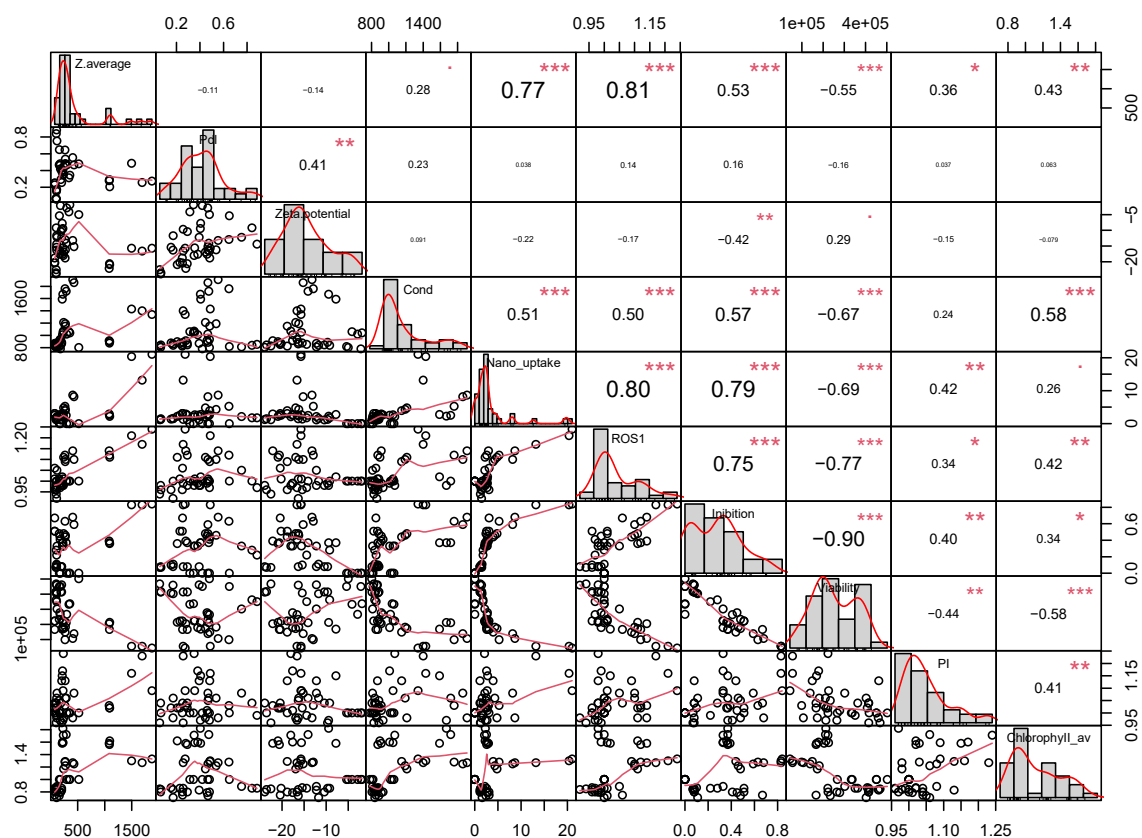


Fig. S2 correlation analysis based on 12 keys parameters:  $\zeta$ -potential, conductivity, z-average hydrodynamic diameter, PDI, pH, concentration and ROS, uptake, cell counting, inhibition, PI and chlorophyll a content in *P.malhamensis* of 20nm and 100nm PS-NPLs in Lake Geneva water and in culture medium. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .