

Supplementary Information

Heteroaggregates of Polystyrene Nanospheres and Organic Matter: Preparation, Characterization and Evaluation of Their Toxicity to Algae in Environmentally Relevant Conditions

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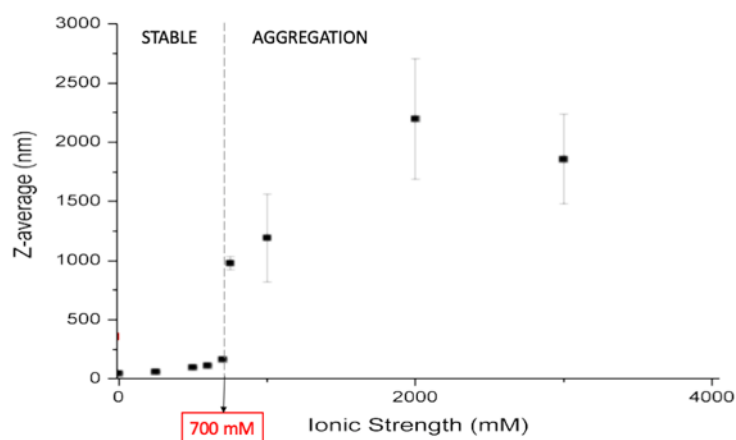


Figure S1: Size of the PS50 dispersion as a function of the ionic strength (with monovalent ions, KCl).

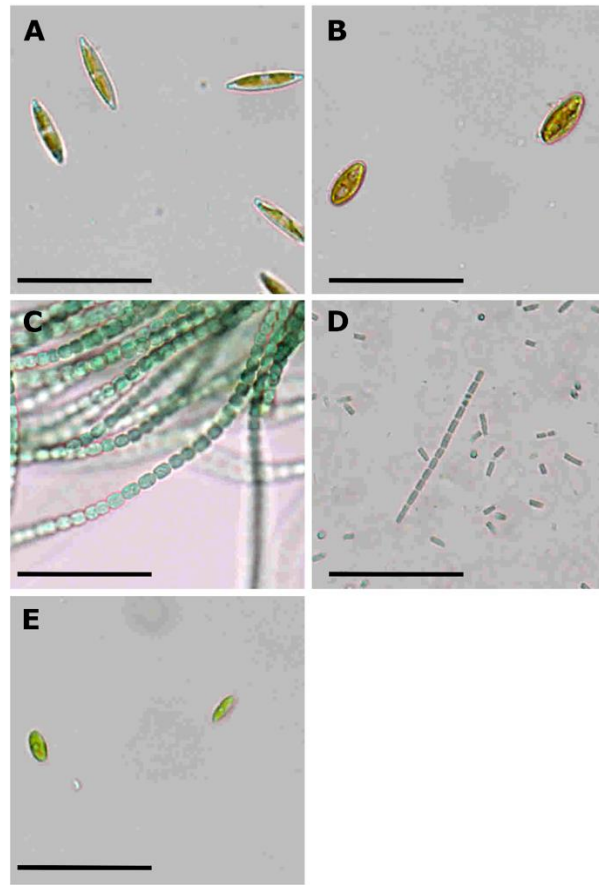


Figure S2. Micrographs of the 5 algal strains used in this study: *Nitzschia palea* (A), *Gomphonema parvulum* (B), *Nostoc* sp. (C), *Komvophoron* sp. (D) and *Scendesmus obliquus* (E). Scale bar represents 10 μm .

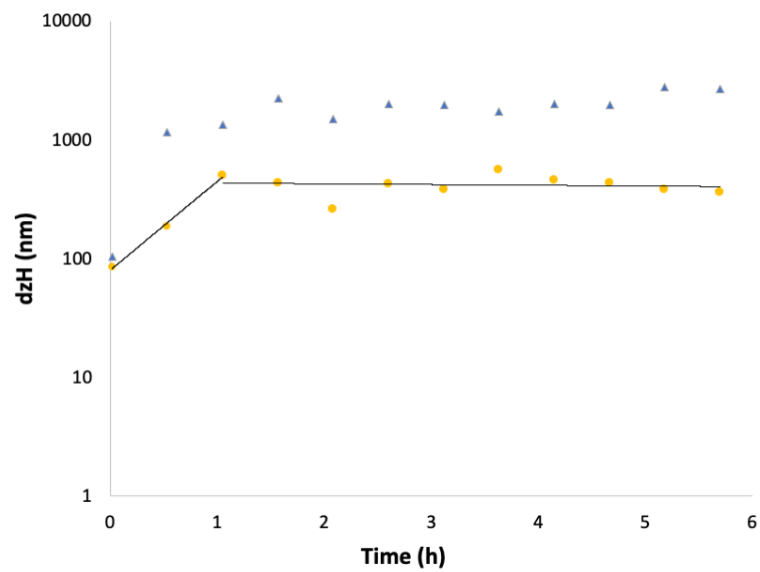


Figure S3: Kinetics of aggregation of PS50 (blue triangles) and PS50-HA (orange circles) in NaCl solution (700 mmol.L^{-1} , pH 7) : the first slope corresponding to a fast aggregation regime and the second one to a rearrangement phase.

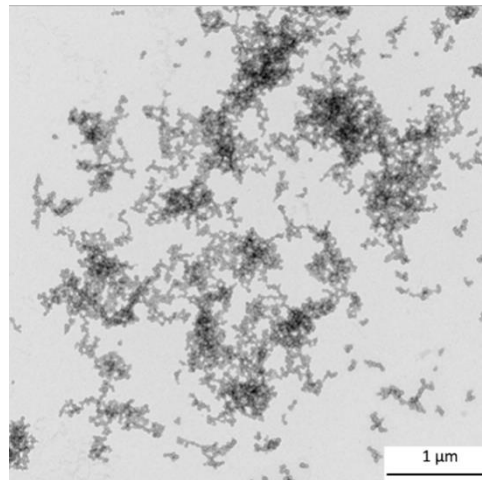


Figure S4: TEM observations of (a) PS-50 homoaggregation ($I = 700 \text{ mmol.L}^{-1}$).

Table S1: Characterization of biological media.

	T °C	pH	Conductivity mS/cm	Ionic strength (I) mmol.L ⁻¹
BGII	16.7	7.68	2.23	23.77
COMBO	16.1	7.88	0.338	5.98

Table S2: Characterization of the nanospheres by DLS.

	Z-Average nm	PdI	Intensity Mean nm	Number Mean nm	Volume Mean nm	Derived Count Rate kcps
PS50	44.59	0.050	47.21	35.48	40.44	15691.2
	45.22	0.048	48.01	35.35	40.60	15828.6
	45.67	0.050	48.63	35.42	40.83	15635.8
PS350	347.0	0.019	364.1	320.5	379.8	16182.4
	351.6	0.099	355.6	329.7	365.5	16583.1
	347.0	0.158	346.2	322.5	354.9	16165.7

Table S3: Zeta potential of particles in the exposure media after adjustment of the pH to 7 (10 mg/L). In brackets are reported the standard deviation values ($n = 4$).

Particles	Zeta potential in COMBO exposition medium (mV)	Zeta potential In BG11 exposition medium (mV)
PS350	-34.7 (± 1.3)	-48.7 (± 2.1)
PS50	-24.3 (± 1.3)	-30.6 (± 1.9)
PS50-HA	-25.2 (± 1.4)	-37.1 (± 3.4)

Table S4: Chemical composition of COMBO algal exposure media.

Ingredients	Quantity (mg.L ⁻¹)
CaCl ₂ . 2H ₂ O (147.02)	36.76

MgSO ₄ . 7H ₂ O (246.48)	36.97
KH ₂ PO ₄ (136.09)	8.71
NaNO ₃ (84 .99)	85.01
NaHCO ₃ (84.01)	12.60
Na ₂ O ₂ SiO ₂ . 2H ₂ O (218.16)	21.84
H ₃ BO ₃ (61.83)	24.00
MnCl ₂ . 4H ₂ O (197.844)	0.18
CuSO ₄ . 5 H ₂ O (249.612)	0.001
ZnSO ₄ . 7 H ₂ O (287.54)	0.022
CoCl ₂ . 6 H ₂ O (237.839)	0.01
Na ₂ MoO ₄ . 2 H ₂ O (241.92)	0.022
NaVO ₂ (121.93)	1.20
Na ₂ EDTA. 2H ₂ O * (328.25)	4.36
FeCl ₃ . 6H ₂ O (270.30)	1.50

Table S5: Chemical composition of BG11 algal exposure media.

Ingredients	Quantity (mg.L ⁻¹)
CaCl ₂ . 2H ₂ O (147.02)	36.0
MgSO ₄ . 7H ₂ O (246.48)	75.0
KH ₂ PO ₄ (136.09)	28.6
NaNO ₃ (84 .99)	1500.0
Na ₂ CO ₃ 10H ₂ O (286.14)	54.0
H ₃ BO ₃ (61.83)	29.0
C ₆ H ₈ O ₇ . H ₂ O (210.06)	6.0
MnCl ₂ . 4H ₂ O (197.844)	1.8
CuSO ₄ . 5 H ₂ O (249.612)	0.1
ZnSO ₄ . 7 H ₂ O (287.54)	0.2
Co(NO ₃) ₂ . 6H ₂ O (290.933)	0.05
Na ₂ MoO ₄ . 2 H ₂ O (241.92)	0.4
Na ₂ EDTA. 2H ₂ O * (328.25)	1.0
Fe(III)(NH ₄) ₃ citrate	6.0