Supplementary Material:

Table S1: Characteristics and nominal concentrations in mg/L of NPs, measured in ultrapure water used in this study at 10^8 particles/mL.

Composition	**Source**	**Nominal concentration (mg/L)**	**Nominal Size (nm)**	**Measured particle size (nm)**	**Poly dispersity Index (PdI)**	**Net surface charge (mV)**	**Metal content (% wt)**	**Average number of particles per ng of metal detected**
PS	Polysciences (Cat. 00876-15)	0.055	**100**	97.8 ± 1.1	0.044 ± 0.028	0.35 ± 0.07 (pH 6.04)	---	---
PS	Polysciences (Cat. 07304-15)	0.440	**200**	225.9 ± 0.7	0.026 ± 0.018	-0.04 ± 0.05 (pH 6.04)	---	---
PS	Polysciences (Cat. 07307-15)	6.871	**500**	536.1 ± 0.4	0.017 ± 0.017	-26.13 ± 1.13 (pH 6.04)	---	---
PS	Polysciences (Cat. 07310-15)	54.980	**1000**	1047.7 ± 5.0	0.100 ± 0.028	-0.004 ± 0.04 (pH 6.04)	---	---
Au-doped PVC	Cassano et al., 2023	0.0601	**200**	199.5 ± 0.7	0.162 ± 0.010	-62.6 ± 2.47 (pH 6.2)	2.6*	8.88×10^{6}*
Au-doped PP	Cassano et al., 2021	0.0403	**200**	186.5 ± 1.4	0.132 ± 0.009	-46.1 ± 2.08 (pH 6.2)	4.1*	8.55×10^{6}*
Au-doped PE	Cassano et al., 2023	0.0405	**200**	185.8 ± 1.9	0.151 ± 0.014	-64.7 ± 1.42 (pH 6.2)	5.1*	5.44×10^{6}*
Pd-doped PS	Mitrano et al., 2019	0.0240	**144**	142.6 ± 1.0	0.289 ± 0.062	-36.2 ± 4.7 (pH 6.59)	0.3	2.2×10^{8}

*Data from Schirinzi et al. (2025)

Table S2: Primer sequences and melting temperatures (Tm) for target genes and for the housekeeping gene, *β-actin*.

Gene	Primer sequences 5' to 3'	Tm (°C)	References
hsp70	*Fw*: TTCAATGATTCACAGAGACAAGC *Rv* :TCCTTGTGATGTTAAGACCAGCTAT	57.1	Nilsson *et al.*, 2014
hsp90	*Fw*:GTCACATCCCAGTATGGTTGG *Rv* :CCATGGTGGAGGTGTCACGG	59	Nilsson *et al.*, 2014
catalase	*Fw*:GGAGAGAATCCCAGAAAGAGTG *Rv*:ACAGTCCAATTTCCCCTCCC	59	Hafez *et al.*, 2021
ferritin	*Fw*:ACGCTTGCACTGATAATCCA *Rv* :AGTTCTACCGTGACGCATCC	55	Nilsson *et al.*, 2014
cyp3026b	*Fw*:TGCCATTGGCATCCACCATGAC *Rv*:AGCCTCCAGCAAAGCAAACCTC	60	Hafez *et al.*, 2021
β-actin	*Fw*:TTGGGTATGGAGTCCTGTGG *Rv* :CCTGGATACATAGTGGTGCC	59.4	Zhou *et al*., 2020

Table S3: Survival rate (in percentages) of adult copepods after 24 h of exposure to different conditions.

Treatment	exposure route	Survival rate (%)
Control: sea water	Waterborne	98
	Foodborne	99
100 nm PS NPs	Waterborne	100
	Foodborne	98
200 nm PS NPs	Waterborne	97
	Foodborne	99
500 nm PS NPs	Waterborne	98
	Foodborne	97
1000 nm PS NPs	Waterborne	97
	Foodborne	98
Pd-doped PS NPs	Waterborne	97
	Foodborne	86
Control: Sodium Cholate	Waterborne	100
	Foodborne	97
Au-doped PVC NPs	Waterborne	100
	Foodborne	100
Au-doped PE NPs	Waterborne	99
	Foodborne	97
Au-doped PP NPs	Waterborne	96
	Foodborne	95

Table S4: Summary of the two-way ANOVA test performed to analyze the effects of the exposure to Au-doped NPs of different polymer composition, the exposure route (foodborne or waterborne) and the interaction between both variables on gene transcription levels. Statistically significant differences ($p < 0.05$) are indicated in **bold**. df: degrees of freedom; F: Fisher's F-ratio; *P*: probability of F.

Gene	**Condition**	**df**	**F**	***P***
hsp70	polymer	3	1.283	0.316
	route of exposure	1	2.499	0.135
	polymer X route	3	3.779	**0.033**
hsp90	polymer	3	1.217	0.338
	route of exposure	1	4.500500	0.051
	polymer X route	3	3.225	0.053
catalase	polymer	3	0.134	0.939
	route of exposure	1	0.670670	0.426
	polymer X route	3	0.051	0.984
ferritin	polymer	3	14.018	**0.001**
	route of exposure	1	1.263	0.279
	polymer X route	3	2.839	0.073
cyp3026b	polymer	3	5.071	**0.008**
	route of exposure	1	0.032	0.860860
	polymer X route	3	2.305	0.118

Table S5: Summary of the two-way ANOVA test performed to analyze the effects of the exposure to PS NPs of different sizes, the exposure route (foodborne or waterborne) and the interaction between both variables on gene transcription levels. There were no statistically significant differences (p >0.05). df: degrees of freedom; F: Fisher's F-ratio; *P*: probability of F.

Gene	Condition	df	F	*P*
hsp70	size	5	1.419	0.253
	route of exposure	1	0.009	0.926
	size X route	5	1.834	0.144
hsp90	size	5	1.075	0.399
	route of exposure	1	0.122	0.73073
	size X route	5	1.771	0.157
catalase	size	5	0.103	0.852
	route of exposure	1	0.388	0.75075
	size X route	5	1.994	0.116
ferritin	size	5	0.346	0.077
	route of exposure	1	2.793	0.108
	size X route	5	2.213	0.083
cyp3026b	size	5	1.650650	0.185
	route of exposure	1	0.018	0.893
	size X route	5	0.777	0.576