Electronic Supplementary Material (ESI) for Environmental Science: Nano.
This journal is © The Royal Society of Chemistry 2018

Supporting Information

No effect of selected engineered nanomaterials on reproduction and survival of the springtail *Folsomia candida*

Jeroen W. Noordhoek[1], Rudo A. Verweij[1], Cornelis A.M. van Gestel[1], Nico M. van Straalen[1], Dick Roelofs[1]

[1]Department of Ecological Science, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands

Corresponding Author

[1]Jeroen W. Noordhoek: +31 20 59 82618, e-mail: jeroen.noordhoek@vu.nl, address: Department of Ecological Science, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands.

Number of pages: 11
Number of tables: 13
Number of figures: 1

Table of Contents

List of tables

List of figures

Table S1. Average cobalt concentration (±SD, n=3) measured in Lufa 2.2 soil spiked with WCCo nanomaterial (NM). Note that WCCo NM contains on average 7% cobalt (measured).

Nominal (mg WCCo/kg dry soil)	**Expected maximum Co concentration (12% of WCCo, according to manufacturer) (mg Co/kg dry soil)**	**Measured Co concentration (mg Co/kg dry soil)**
0		**0.83 ± 0.14**
200	24	**18.5 ± 1.73**
400	48	**31.3 ± 2.37**
800	96	**60.5 ± 4.50**
1600	192	**108 ± 3.38**
3200	384	**222 ± 11.0**
6400	**768**	**395 ± 17.1**

Table S2. Average cobalt concentration (±SD, n=3) measured in Lufa 2.2 soil spiked with $CoCl_2$. Recoveries (%) are presented in between brackets.

Nominal (mg Co/kg dry soil)	Measured (mg Co/kg dry soil)
0	**1.46 ± 0.05**
62.5	**61.6 ± 5.67 (99%)**
125	**122 ± 0.98 (98%)**
250	**242 ± 10.3 (97%)**
500	**526 ± 11.4 (105%)**
1000	**1038 ± 40.8 (104%)**

Table S3. Average copper concentration (±SD, n=3) measured in Lufa 2.2 soil spiked with CuO nanomaterial (NM) and $CuCl_2$. Recoveries (%) are presented in between brackets.

Nominal (mg Cu/kg dry soil)	**Measured (mg Cu/kg dry soil)**	
	CuO NM	**$CuCl_2$**
0	4.45 ± 0.35	**4.73 ± 0.21**
100		**111 ± 1.18 (111%)**
200	195 ± 8.08 (97%)	**244 ± 2.44 (122%)**
400	351 ± 8.08 (88%)	**521 ± 5.96 (130%)**
800	742 ± 25.5 (93%)	**898 ± 5.05 (112%)**
1600	1439 ± 22.3 (90%)	**1690 ± 7.02 (106%)**
3200	3147 ± 94.8 (98%)	
6400	**6286 ± 36.6 (98%)**	

Table S4. Average iron concentration (±SD, n=3) measured in Lufa 2.2 soil spiked with Fe_2O_3 NM and $FeCl_3$. Recoveries (%) are presented in between brackets.

Nominal (mg Fe/kg dry soil)	Measured (mg Fe/kg dry soil)			
	Fe_2O_3 NM	**Fe_2O_3 NM corrected for control**	**$FeCl_3$**	**$FeCl_3$ corrected for control**
0	3591 ± 127		3526 ± 208	
100			3617 ± 65.9	**92 (92%)**
200	3829 ± 33.9	239 (119%)	3767 ± 48.1	**241 (121%)**
400	3976 ± 96.3	386 (96%)	3956 ± 94.9	**430 (108%)**
800	4363 ± 186	773 (97%)	4305 ± 491	**779 (97%)**
1600	4957 ± 276	1367 (85%)	5109 ± 38.3	**1584 (99%)**
3200	6311 ± 219	2720 (85%)		
6400	**9151 ± 51.6**	**5560 (87%)**		

Table S5. pH_{CaCl2} of Lufa 2.2 soil freshly spiked with WCCo nanomaterial (NM), iron oxide nanomaterial (Fe_2O_3-NM), copper oxide nanomaterial (CuO-NM), organic pigment red, Irgazin® nanomaterial (OP-NM) and multi-walled carbon nanotubes (MWCNT) (T = 0) and after 28 days (T = 28) equilibration. pH values are the average of three replicates.

	WCCo-NM		Fe_2O_3-NM		CuO-NM		OP-NM		MWCNT	
Nominal	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}
(mg /kg dry soil)	T = 0	T = 28	T = 0	T = 28	T = 0	T = 28	T = 0	T = 28	T = 0	T = 28
Control	6.27	5.65	6.22	5.67	6.37	5.76	6.36	5.70	6.35	5.80
200	6.32	5.67	6.22	5.62	6.34	5.92	6.36	5.69	6.35	5.76
400	6.36	5.65	6.21	5.68	6.35	5.90	6.38	5.70	6.35	5.76
800	6.40	5.71	6.21	5.67	6.35	5.97	6.37	5.76	6.35	5.70
1600	6.48	5.86	6.21	5.65	6.36	6.17	6.38	5.76	6.36	5.79
3200	6.55	5.90	6.23	5.65	6.37	6.31	6.36	5.75	6.37	5.78
6400	6.60	6.17	6.22	5.62	6.36	6.35	6.34	5.88	6.37	5.91

Table S6. pH_{CaCl2} of Lufa 2.2 soil freshly spiked with iron chloride ($FeCl_3$) and copper chloride ($CuCl_2$) (T = 0) and after 28 days (T = 28) equilibration. pH values are the average of three replicates.

	$FeCl_3$		$CuCl_2$	
Nominal	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}	pH_{CaCl2}
(mg /kg dry soil)	T = 0	T = 28	T = 0	T = 28
Control	6.21	5.71	6.27	5.71
100	5.99	5.48	6.15	5.68
200	5.78	5.54	6.08	5.67
400	5.42	5.48	6.24	5.76
800	4.54	4.75	5.88	6.03
1600	3.41	3.51	5.56	5.71

Table S7. pH_{CaCl2} of Lufa 2.2 soil freshly spiked with $CoCl_2$ (T = 0) and after 28 days (T = 28) equilibration. pH values are the average of three replicates.

Nominal (mg Co/kg dry soil)	pH_{CaCl2} T = 0	pH_{CaCl2} T = 28
Control	5.99	5.75
62.5	5.93	5.72
125	5.84	5.81
250	5.90	5.86
500	5.87	5.99
1000	5.74	5.98

Table S8. Cobalt concentrations (n=3) measured in the pore water of Lufa 2.2 soil spiked with WCCo nanomaterial (NM) expressed as mg Co/l, at start (T=0 days) and end (T=28 days) of test. Detection limit = 0.003.

Nominal (mg WCCo/kg dry soil)	mg Co/l T = 0	mg Co/l T = 28
Control	0.001	0.001
3200	3.29	1.20
6400	3.88	1.88

Table S9. Cobalt concentrations (n=3) measured in the pore water of Lufa 2.2 soil spiked with $CoCl_2$ expressed as mg Co/l, at start (T=0 days) and end (T=28 days) of test. Detection limit = 0.003.

Nominal (mg Co/kg dry soil)	mg Co/l T = 0	mg Co/l T = 28
Control	-0.001	-0.002
250	7.70	15.5
500	44.2	58.6
1000	366	332

Table S10. Iron concentrations (n=3) measured in the pore water of Lufa 2.2 soil spiked with Fe_2O_3 NM expressed as mg Fe/l, at start (T=0 days) and end (T=28 days) of test. Detection limit = 0.012.

Nominal (mg Fe/kg dry soil)	mg Fe/l T = 0	mg Fe/l T = 28
Control	0.14	0.06
800	0.13	0.04
1600	0.07	0.03
3200	0.09	0.04
6400	0.12	0.05

Table S11. Iron concentrations (n=3) measured in the pore water of Lufa 2.2 soil spiked with $FeCl_3$ expressed as mg Fe/l, at start (T=0 days) and end (T=28 days) of test. Detection limit = 0.012.

Nominal (mg Fe/kg dry soil)	mg Fe/l T = 0	mg Fe/l T = 28
Control	0.11	0.05
400	0.06	0.04
800	8.02	2.82
1600	129	109

Table S12. Copper concentrations (n=3) measured in the pore water of Lufa 2.2 soil spiked with CuO nanomaterial (NM) expressed as mg Cu/l, at start (T=0 days) and end (T=28 days) of test. Detection limit = 0.003.

Nominal (mg Cu/kg dry soil)	mg Cu/l T = 0	mg Cu/l T = 28
Control	0.01	0.02
6400	2.31	0.41

Table S13. Copper concentrations (n=3) measured in the pore water of Lufa 2.2 soil spiked with $CuCl_2$ expressed as mg Cu/l, at start (T=0 days) and end (T=28 days) of test. Detection limit = 0.003.

Nominal (mg Cu/kg dry soil)	mg Cu/l T = 0	mg Cu/l T = 28
Control	0.06	0.02
400	0.15	0.18
800	3.74	1.13
1600	17.05	10.78

Figure S1. Picture of a snapfrozen (with liquid nitrogen) *Folsomia candida* after 28 days of exposure to organic pigment (OP) nanomaterials. The picture shows that the compound is present in the animal's midgut. Picture taken by Jeroen Noordhoek.