Supporting Information

for

NanoE-Tox: New and in-depth database concerning ecotoxicity of nanomaterials

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Supplementary tables

Table S1: Total number of publications in Thomson Reuters Web of Science™ for different applications of eight selected nanomaterials. Search was performed combining the keywords listed in the table with light grey background. The search was done on March 19th, 2015.

nano* AND	**Ag NPs**	**CeO_2 NPs**	**CNTs**	**CuO NPs**	**FeO_x NPs**	**Fullerenes**	**TiO_2 NPs**	**ZnO NPs**	**Total**
Fields of application	silver OR Ag	cerium *oxide OR ceria OR CeO2	carbon nanotu* OR CNT OR *CNT	copper oxide OR CuO	iron *oxide OR Fe3O4 OR Fe2O3	fulleren*	titanium *oxide OR titania OR TiO2	zinc oxide OR ZnO	
Hydrogen storage	189	124	3642	64	195	357	314	110	**1040**
Environmental remediation	110	16	155	36	219	23	303	74	**655**
Catalysis	2043	624	2553	458	1225	169	2652	711	**5215**
Drug delivery	999	55	2966	60	3687	272	515	284	**4818**
Medical imaging	97	7	151	4	292	19	32	21	**368**
Photovoltaics	299	3	368	41	14	355	632	401	**1443**
Textiles	568	11	482	44	77	14	650	305	**1090**
Therapeutics	109	16	324	8	322	35	32	17	**414**
Reinforced composites	172	37	4161	53	83	91	260	102	**589**
Electronics	1080	16	3331	113	116	286	278	542	**1335**
Optics	987	20	638	35	120	89	249	256	**749**
Coatings and pigments	19	12	10	8	36	1	143	53	**241**
Cosmetics	133	24	95	8	36	28	265	148	**485**
Ceramics applications	186	140	413	53	132	17	578	202	**982**
Anti-oxidants	10	13	14	4	4	7	3	5	**23**
Lubrication	78	10	181	26	37	115	55	35	**268**
Sensors	5327	288	13004	977	1421	255	2596	4159	**9408**
Absorbents	37	9	158	10	77	4	45	35	**171**
Energetics	136	18	801	11	38	267	218	54	**588**
Magnetics	84	3	154	29	1156	13	51	53	**1302**
Water purification	304	33	905	56	468	60	782	142	**1508**
Air emissions reduction	18	9	23	7	9	3	19	23	**61**
Natural and green products	36	1	11	2	10	0	6	6	**24**
Quantum computing	31	5	282	1	52	49	26	20	**148**
Masonry and building materials	1	0	0	0	0	0	1	0	**1**
Photonics	297	2	322	17	31	31	87	152	**318**
Surfactants	689	97	1166	135	468	80	506	335	**1524**
Antimicrobials	2931	13	299	120	154	52	504	341	**1171**
Total	**16970**	**1606**	**36609**	**2380**	**10479**	**2692**	**11802**	**8586**	**35939**

Table S2: Mechanisms of toxic action of selected ENMs in different organisms based on information in NanoE-Tox database.

	Ag	CeO_2	CNTs	CuO	Fullerenes	TiO_2	ZnO
Released ions	bacteria [1-5] bivalves [6] crustaceans [7-9] earthworms [10] plants [11-13] protists [14] yeasts [15]			bacteria [5,16-19] crustaceans [8,20] insects [21]			bacteria [16-18,22] crustaceans [23] echinoderms [24]
Effect of NPs/ their primary size	bacteria [25] crustaceans [26,27]			algae [28] plants [29]		algae [30] crustaceans [30,31] nematodes [32] rotifers [30]	plants [33]
Ions + NPs	algae [34] crustaceans [35] fish [36,37] nematodes [38]			protists [39] snails [40]			bacteria [5] crustaceans [41] fish [42]
Destabilization of cell membranes/ mechanical membrane damage	bacteria [43,44] earthworms [45] yeasts [15]	algae [46,47]	algae [48] bacteria [49] crustaceans [50]	protists [39]		bacteria [51] fish [52]	algae [53] fish [42]
Oxidative stress	bacteria [5,43,54] insects [55] bivalves [6] plants [12] yeasts [15]	nematodes [56]	algae [48,57] crustaceans [50]		crustaceans [58]	bacteria [43,51] fish [52,59] nematodes [32]	bacteria [60] earthworms [61] fish [62] snails [63]
DNA damage/ genotoxic	crustaceans [64] insects [65] plants [66]						bacteria [60] earthworms [61]
Disturbing ATP production			algae [57]				
Shading effect		algae [46]	algae [48,67]				
Effect of accumulation on the organisms	fish [36]	algae [46] crustaceans [68,69]	algae [67]			crustaceans [70]	fish [42]
Binding to -SH groups	fish [71]						

*There was no information about mechanisms of toxic action of FeO_x in the NanoE-Tox database

Table S3: Accumulation and uptake of selected ENMs in different organisms based on information in NanoE-Tox database.

	Ag	CeO_2	CNTs	CuO	FeO_x	Fullerenes	TiO_2	ZnO
Accumulated in organisms	bacterial biofilm [72] bivalves [6] crustaceans [73] earthworms [10] plants [11-13,66,74]		amphibians [75] bivalves [76] crustaceans [77,78]	bivalves [79] crustaceans [20] insects [21] snails [40] plant roots [29]	crustaceans [80] fish [81]	blackworms [82] crustaceans [83,84]	corals [85] crustaceans [86] fish [87-90] nematodes [32] plants [91,92]	earthworms [61] fish [42]
Accumulated on surface of organisms	crustaceans [93] fish eggs [37]	crustaceans [69] plant roots [94]	algae [67] bivalves [95] crustaceans [95-97] plant roots [98]	insects [21]			bacteria [99] crustaceans [70] plants [100]	algae [101] plant roots [102]
Ingested by organisms	crustaceans [26] protists [14]	nematodes [56]	amphibians [103] bivalves [76,95] crustaceans [77,84,95,96,104,105] protists [106]	crustaceans [20]	crustaceans [80]	crustaceans [84]	crustaceans [84,107,108] lugworms [109] nematodes [32]	crustaceans [84]
Translocation seed → plant (yes/no)			no [98]					
Translocation root → shoot (yes/no)		no/very low [94]		limited [29]		yes [98]	yes if size is less than 36 nm [92]	very low [102]
Other observations					BCF in fish larvae 0.04…0.14 [81]		Significant uptake in *E. coli; [60]* Dose-dependent increase in internalization in bacteria; [110] BCF in coral tissue 2…62, in posterior mixture 238…594; [85] BCF in crustaceans under illumination 502, in dark 318 [111]	Significant uptake in *E. coli; [60]* Dose-dependent increase in internalization in bacteria [110]

Table S4: List of journals in NanoE-Tox.

	Journal title	No. of papers	No. of entries	5-year impact factor
1	ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY	29	156	3.282
2	ENVIRONMENTAL SCIENCE & TECHNOLOGY	25	170	6.277
3	CHEMOSPHERE	18	129	3.897
4	ENVIRONMENTAL POLLUTION	12	107	4.306
5	AQUATIC TOXICOLOGY	12	31	3.948
6	SCIENCE OF THE TOTAL ENVIRONMENT	11	85	3.906
7	JOURNAL OF HAZARDOUS MATERIALS	10	79	5.123
8	PloS one	7	34	4.015
9	ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY	6	73	2.715
10	NANOTOXICOLOGY	5	23	7.766
11	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	5	62	2.951
12	ECOTOXICOLOGY	4	16	3.191
13	JOURNAL OF NANOPARTICLE RESEARCH	4	31	2.927
14	ENVIRONMENTAL TOXICOLOGY	4	50	2.371
15	JOURNAL OF ENVIRONMENTAL MONITORING	4	10	2.133
16	ENVIRONMENTAL TOXICOLOGY AND PHARMACOLOGY	4	28	2.093
17	ACS Nano	3	26	13.774
18	NANOMEDICINE	3	26	5.966
19	TOXICOLOGICAL SCIENCES	3	38	4.855
20	JOURNAL OF NANOBIOTECHNOLOGY	3	19	#N/A
21	ANALYTICAL AND BIOANALYTICAL CHEMISTRY	2	65	3.744
22	DESALINATION	2	29	3.481
23	MARINE ENVIRONMENTAL RESEARCH	2	10	2.525
24	JOURNAL OF ENVIRONMENTAL SCIENCES-CHINA	2	3	2.465
25	ARCHIVES OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY	2	6	2.135
26	TOXICOLOGICAL AND ENVIRONMENTAL CHEMISTRY	2	24	#N/A
27	NATURE NANOTECHNOLOGY	1	5	38.586
28	SMALL	1	4	8.416
29	CARBON	1	7	6.638
30	WATER RESEARCH	1	6	6.092
31	FREE RADICAL BIOLOGY AND MEDICINE	1	2	5.983
32	SOIL BIOLOGY & BIOCHEMISTRY	1	1	4.785
33	LANGMUIR	1	6	4.489
34	COLLOIDS AND SURFACES B-BIOINTERFACES	1	14	4.226
35	APPLIED MICROBIOLOGY AND BIOTECHNOLOGY	1	12	4.138
36	ENVIRONMENTAL RESEARCH	1	4	4.033
37	TOXICOLOGY	1	9	3.884
38	TOXICOLOGY LETTERS	1	4	3.706
39	ENVIRONMENTAL MICROBIOLOGY REPORTS	1	3	3.556
40	ECOLOGICAL ENGINEERING	1	2	3.479
41	CYTOMETRY PART A	1	2	3.306
42	FOOD AND CHEMICAL TOXICOLOGY	1	1	3.21
43	PROCESS BIOCHEMISTRY	1	2	2.922
44	MUTATION RESEARCH-GENETIC TOXICOLOGY AND ENVIRONMENTAL MUTAGENESIS	1	4	2.716
45	COLLOIDS AND SURFACES A-PHYSICOCHEMICAL AND ENGINEERING ASPECTS	1	10	2.494
46	HYDROBIOLOGIA	1	3	2.35

	Journal title	No. of papers	No. of entries	5-year impact factor
47	PARASITOLOGY RESEARCH	1	2	2.286
48	APPLIED BIOCHEMISTRY AND BIOTECHNOLOGY	1	1	1.994
49	WATER AIR AND SOIL POLLUTION	1	1	1.943
50	ANALYTICAL METHODS	1	1	1.913
51	JOURNAL OF TOXICOLOGY AND ENVIRONMENTAL HEALTH-PART A-CURRENT ISSUES	1	2	1.868
52	BIOLOGICAL TRACE ELEMENT RESEARCH	1	1	1.656
53	JOURNAL OF MICROBIOLOGY AND BIOTECHNOLOGY	1	2	1.484
54	SCIENTIFIC WORLD JOURNAL	1	12	1.3
55	JOURNAL OF ENVIRONMENTAL SCIENCE AND HEALTH PART A-TOXIC/HAZARDOUS SUBSTANCES & ENVIRONMENTAL ENGINEERING	1	4	1.233
56	BULLETIN OF THE KOREAN CHEMICAL SOCIETY	1	2	0.797
57	ASIAN PACIFIC JOURNAL OF TROPICAL MEDICINE	1	4	0.665
58	ARCHIVES OF BIOLOGICAL SCIENCES	1	4	0.606
59	INLAND WATER BIOLOGY	1	17	0.321
60	ENVIRONMENTAL ENGINEERING RESEARCH	1	3	#N/A
61	JOURNAL OF ENVIRONMENTAL HEALTH SCIENCES	1	16	#N/A
62	ACS SUSTAINABLE CHEMISTRY & ENGINEERING	1	3	#N/A
63	ENVIRONMENTAL HEALTH AND TOXICOLOGY	1	3	#N/A
64	ENVIRONMENTAL SCIENCE-PROCESSES & IMPACTS	1	2	#N/A
65	NANOCON 2009, CONFERENCE PROCEEDINGS	1	6	#N/A
66	NANOSAFE 2012: INTERNATIONAL CONFERENCES ON SAFE PRODUCTION AND USE OF NANOMATERIALS	1	1	#N/A
	TOTAL	224	1518	

Table S5: Organism-wise distribution of data in NanoE-Tox. Number in parenthesis indicates number of entries in the database.

		CNT	Fullerenes	ZnO	CeO2	Ag	TiO2	CuO	FeOx
Algae	Green algae	*Chlorella sp. (3)* *Chlorella vulgaris (18)* *Dunaliella tertiolecta (2)* *Pseudokirchneriella subcapitata (7)*		*Pseudokirchneriella subcapitata (5)*	*Chlamydomonas reinhardtii (4)* *Pseudokirchneriella subcapitata (68)*	*Chlorella vulgaris (2)* *Dunaliella tertiolecta (2)* *Pseudokirchneriella subcapitata (4)*	*Chlamydomonas moewusii (1)* *Chlamydomonas reinhardtii (1)* *Chlorella sp (2)* *Chlorella vulgaris (2)* *Desmodesmus subspicatus (4)* *Phaeodactylum tricornutum (3)* *Pseudokirchneriella subcapitata (23)* *Scenedesmus sp (2)* *Scenedesmus obliquus (2)*	*Chlorella spp (2)* *Nitellopsis obtusa (2)*	
	Red algae	*Thalassiosira pseudonana (4)*		*Thalassiosira weissflogii (3)*	*Nitzschia palea (2)*	*Ceramium tenuicorne (12)*	*Scenedesmus quadricauda (1)*		
Amphibians		*Ambystoma mexicanum (1)* *Xenopus laevis (13)*			*Pleurodeles waltl (2)* *Xenopus laevis (3)*				
Bacteria		*Bacillus subtilis (2)* *Cupriavididus metallidurans (1)* *Escherichia coli (4)* *Pseudomonas aeruginosa (2)* *Staphylococcus aureus (2)* *Vibrio fischeri (1)*	*Bacillus stearothermophilus (1)* *Escherichia coli (12)* *Vibrio fischeri (2)*	*Anabaena flos-aquae (3)* *Escherichia coli (24)* *Pseudomonas putida (7)* *Vibrio fischeri (6)*	*Anabaena (24)* *Escherichia coli (1)* *Vibrio fischeri (3)*	*Arthrobacter globiformis (2)* *Bacillus aquimaris (12)* *Bacillus thuringiensis (12)* *Enterococcus faecalis (1)* *Escherichia coli (27)* *Klebsiella pneumoniae (1)* *Nitrosomonas europaea (2)* *Pseudomonas aeruginosa (2)* *Pseudomonas chlororaphis (10)* *Pseudomonas putida (16)* *Staphylococcus aureus (2)* *Staphylococcus epidermidis (1)* *Vibrio fischeri (4)*	*Anabaena variabilis (1)* *Cupriavididus metallidurans (6)* *Escherichia coli (37)* *Pseudomonas putida (2)* *Vibrio fischeri (18)*	*Escherichia coli (13)* *Vibrio fischeri (7)*	*Escherichia coli (2)* *Vibrio fischeri (3)*
Bivalves	Clams					*Macoma balthica (2)*		*Macoma balthica (1)*	
	Mussels	*Mytilus galloprovincialis (2)* *Villosa iris (2)*	*Mytilus galloprovincialis (2)*			*Elliptio complanata (2)*	*Dreissena polymorpha (1)* *Mytilus galloprovincialis (4)*		
Cnidarians	Corals					*Acropora japonica (8)*	*Montastraea faveolata (2)*		
	Hydra	*Hydra attenuata (1)*	*Hydra attenuata (1)*				*Hydra attenuata (1)*		
Crustaceans	Amphipods	*Hyalella azteca (4)* *Leptocheirus plumulosus (1)*					*Gammarus fossarum (7)*		
	Branchiopods	*Ceriodaphnia dubia (11)* *Daphnia magna (15)* *Daphnia similis (2)* *Thamnocephalus platyurus (1)*	*Daphnia magna (7)* *Daphnia pulex (4)* *Thamnocephalus platyurus (1)*	*Ceriodaphnia affinis (4)* *Daphnia magna (28)* *Thamnocephalus platyurus (10)*	*Ceriodaphnia affinis (4)* *Ceriodaphnia dubia (1)* *Chydorus sphaericus (1)* *Daphnia magna (34)* *Daphnia pulex (4)* *Daphnia similis (2)* *Thamnocephalus platyurus (3)*	*Artemia nauplii (12)* *Chydorus sphaericus (3)* *Daphnia galeata (3)* *Daphnia magna (141)* *Daphnia pulex (3)* *Thamnocephalus platyurus (8)*	*Artemia salina (8)* *Ceriodaphnia affinis (4)* *Ceriodaphnia dubia (3)* *Chydorus sphaericus (1)* *Daphnia magna (78)* *Daphnia similis (17)* *Thamnocephalus platyurus (4)*	*Daphnia magna (33)* *Thamnocephalus platyurus (12)*	*Ceriodaphnia dubia (2)* *Daphnia magna (1)*
	Copepods	*Amphiascus tenuiremis (2)* *Tigriopus japonicus (6)*		*Acartia tonsa (6)*		*Tisbe battagliai (8)*			
	Ostracods			*Heterocypris incongruens (1)*					
Fish		*Danio rerio (2)* *Oncorhynchus mykiss (3)* *Oreochromis niloticus (1)* *Oryzias melastigma (2)*	*Danio rerio (5)*	*Cyprinus carpio (1)* *Danio rerio (6)*	*Danio rerio (9)*	*Danio rerio (30)* *Oncorhynchus mykiss (4)* *Oryzias latipes (2)* *Pimephales promelas (4)*	*Cyprinus carpio (4)* *Danio rerio (10)* *Oncorhynchus mykiss (3)* *Oryzias latipes (6)*		*Danio rerio (4)* *Oryzias latipes (1)*
Insects		*Chironomus dilutus (3)* *Drosophila melanogaster (2)*	*Drosophila melanogaster (1)*	*Folsomia candida (6)*	*Chironomus riparius (6)*	*Aedes aegypti (2)* *Chironomus riparius (7)* *Culex quinquefasciatus (2)* *Drosophila melanogaster (4)* *Folsomia candida (2)*	*Bovicola ovis (1)* *Chironomus riparius (2)* *Hippobosca maculata (1)*	*Allogamus ligonifer (2)*	
Nematodes				*Caenorhabditis elegans (1)*	*Caenorhabditis elegans (7)*	*Caenorhabditis elegans (18)*	*Caenorhabditis elegans (15)*		
Plants		*Cucurbita pepo (1)* *Oryza sativa (3)*	*Lemna gibba (3)* *Oryza sativa (1)*	*Cucurbita pepo (2)* *Fagopyrum esculentum (2)* *Lactuca sativa (1)* *Lepidium sativum (10)* *Lolium perenne (1)* *Raphanus sativus (1)* *Vicia faba (1)*	*Cucumis sativus (3)* *Cucurbita maxima (3)* *Lactuca sativa (3)* *Solanum lycopersicum (3)* *Spinacia oleracea (1)* *Triticum aestivum (3)*	*Allium cepa (2)* *Arabidopsis thaliana (3)* *Cucumis sativus (1)* *Cucurbita pepo (9)* *Hordeum vulgare (10)* *Lactuca sativa (2)* *Lemna gibba (4)* *Linum usitatissimum (6)* *Lolium perenne (7)* *Lycopersicum esculentum (10)* *Nicotiana tabacum (2)* *Zea mays (12)*	*Cucumis sativus (1)* *Lactuca sativa (3)* *Lemna minor (3)* *Lepidium sativum (3)* *Raphanus sativus (1)* *Solanum lycopersicum (1)* *Spinacia oleracea (1)* *Triticum aestivum (5)*	*Lactuca sativa (1)* *Raphanus sativus (1)* *Schoenoplectus tabernaemontani (2)*	*Cucumis sativus (2)* *Lactuca sativa (3)* *Raphanus sativus (1)* *Solanum lycopersicum (1)* *Spinacia oleracea (1)*
Protists		*Tetrahymena thermophila (5)*		*Bodo saltans (1)* *Euglena gracilis (3)* *Tetrahymena thermophila (4)*	*Bodo saltans (2)*	*Tetrahymena thermophila (2)*	*Bodo saltans (2)*	*Tetrahymena thermophila (2)*	
Rotifers							*Brachionus plicatilis (3)*	*Brachionus calyciflorus (2)*	
Echinoderms				*Lytechinus pictus (1)*			*Lytechinus pictus (1)*		
Snails				*Biomphalaria alexandrina (3)*		*Physa acuta (3)* *Potamopyrgus antipodarum (3)*	*Haliotis diversicolor supertexta (4)*	*Potamopyrgus antipodarum (2)*	
Worms		*Arenicola marina (1)* *Eisenia veneta (6)* *Lumbriculus variegatus (3)*	*Eisenia fetida (4)* *Eisenia veneta (4)* *Lumbricus rubellus (5)* *Lumbriculus variegatus (2)*	*Eisenia fetida (6)*		*Eisenia andrei (4)* *Eisenia fetida (4)* *Lumbricus terrestris (13)*	*Arenicola marina (1)* *Eisenia andrei (7)* *Eisenia fetida (10)*		
Yeasts						*Saccharomyces cerevisiae (1)*	*Saccharomyces cerevisiae (1)*		*Saccharomyces cerevisiae (2)*

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