Toxicity, bioaccumulation and trophic transfer of engineered nanoparticles in the aquatic environment

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Curriculum Vitae

Qi Yu was born on May 28th, 1992 in Qitaihe, Heilongjiang Province, China. She graduated from Qitaihe Experimental Senior High School in 2010, and started her Bachelor study in Ecology in Northeast Normal University from 2010 to 2014. After then, she continued her Master study in Environmental Science and Engineering in Dalian University of Technology from 2014 to 2017. She was supervised by Prof. Hong-Bin Xie in the group of Prof. Jingwen Chen. Her Master thesis was entitled "Atmospheric transformation mechanism and kinetics of alternatives of polybrominated diphenyl ethers initiated by OH radical". During her Master period, she presented her research findings in the 11th National Conference on Environmental Chemistry Conference in Guangzhou, and she was nominated for the "Outstanding Presentation". Her thesis was awarded one of the "Excellent Master's Thesis (2017016)" of Liaoning Province, and she was one of the "Outstanding Graduates" of Dalian University of Technology. After her Master study, she was awarded a scholarship by the "Chinese Scholarship Council" to continue PhD research in the Institute of Environmental Sciences in Leiden University in 2017 under the supervision of Prof. dr. Willie Peijnenburg, Prof. dr. Martina Vijver and Dr. Thijs Bosker. Her PhD research focused on the fate, bioaccumulation, toxicity and trophic transfer of nanoparticles, and the impact of natural organic matters. She presented her research findings in the Anniversary symposium of MilieuChemTox in Utrecht. She was a board member of "Leiden Science China" society.

Publication list

Qi Yu, Zhenyan Zhang, Fazel Abdolahpur Monikh, Juan Wu, Zhuang Wang, Martina G. Vijver, Thijs Bosker & Willie J. G. M. Peijnenburg (2022), Trophic transfer of Cu nanoparticles in a simulated aquatic food chain, *Ecotoxicology and Environmental Safety*, 242: 113920.

Qi Yu, Zhuang Wang, Guiyin Wang, Willie J.G.M. Peijnenburg & Martina G. Vijver (2021), Effects of natural organic matter on the joint toxicity and accumulation of Cu nanoparticles and ZnO nanoparticles in *Daphnia magna*, *Environmental Pollution*, 292: 118413.

Qi Yu, Zhuang Wang, Yujia Zhai, Fan Zhang, Martina G. Vijver & Willie J.G.M. Peijnenburg (2021), Effects of humic substances on the aqueous stability of cerium dioxide nanoparticles and their toxicity to aquatic organisms, *Science of the Total Environment*, 781: 146583.

Qi Yu, Tom A.P. Nederstigt, Zhuang Wang, Juan Wu, Aranka Kolmas, Thijs Bosker, Zuzanna Filipiak, Willie J.G.M. Peijnenburg & Martina G. Vijver, Accumulation kinetics of polystyrene nano- and microplastics in the waterflea *Daphnia magna* and trophic transfer to the mysid *Limnomysis benedeni*. In preparation

Qi Yu, Pan Wang, Fangfang Ma, Hong-Bin Xie, Ning He & Jingwen Chen. (2017), Computational investigation of the nitrosation mechanism of piperazine in CO_2 capture, *Chemosphere*, 186:341-349.

Qi Yu, Hong-Bin Xie, Tianchi Li, Fangfang Ma, Zihao Fu, Zhongyu Wang, Chao Li, Zhiqiang Fu, Deming Xia & Jingwen Chen (2017), Atmospheric chemical reaction mechanism and kinetics of 1,2-bis(2,4,6-tribromophenoxy)ethane initiated by oh radical: a computational study, *RSC Advances*, 7(16): 9484-9494.

Qi Yu, Hong-Bin Xie & Jingwen Chen (2016), Atmospheric chemical reactions of alternatives of polybrominated diphenyl ethers initiated by OH: A case study on triphenyl phosphate, *Science of the Total Environment*, 571:1105-1114.

Zhenyan Zhang, Xiaoji Fan, Willie J.G.M. Peijnenburg, Meng Zhang, Liwei Sun, Yujia Zhai, **Qi Yu**, Juan Wu, Tao Lu, Haifeng Qian (**2021**), Alteration of dominant cyanobacteria in different bloom periods caused by abiotic factors and species interactions, *Journal of Environmental Sciences*, 99: 1-9.

Juan Wu, **Qi Yu**, Thijs Bosker, Martina G. Vijver & Willie J.G.M. Peijnenburg (**2020**), Quantifying the relative contribution of particulate versus dissolved silver to toxicity and uptake kinetics of silver nanowires in lettuce: impact of size and coating, *Nanotoxicology,* 14(10): 1399-1414.

Zhuang Wang, Lan Song, Nan Ye, **Qi Yu**, Yujia Zhai, Fan Zhang, Martina G. Vijver & Willie J.G.M. Peijnenburg (**2020**), Oxidative stress actuated by cellulose nanocrystals and nanofibrils in aquatic organisms of different trophic levels, *NanoImpact,* 17: 100211.

Fangfang Ma, Zhezheng Ding, Jonas Elm, Hong-Bin Xie, **Qi Yu**, Cong Liu, Chao Li, Zhiqiang Fu, Lili Zhang & Jingwen Chen (**2018**). Atmospheric oxidation of piperazine initiated by cl: unexpected high nitrosamine yield, *Environmental Science and Technology*, 52(17), 9801-9809.

Zhongyu Wang, Zhiqiang Fu, **Qi Yu** & Jingwen chen (**2017**), Oxidation reactivity of 1,2-bis(2,4,6-tribromophenoxy)ethane (BTBPE) by Compound I model of cytochrome P450s, *Journal of Environmental Sciences*, 62(12):11-21.

Hong-Bin Xie, Fangfang Ma, **Qi Yu**, Ning He & Jingwen Chen (**2017**). Computational study of the reactions of chlorine radicals with atmospheric organic compounds featuring nhx–π-bond (x = 1, 2) structures, *Journal of Physical Chemistry A*, 121(8), 1657.

Zihao Fu, Ning He, Putian Zhou, Jiaxu Liu, Hong-Bin Xie, **Qi Yu**, Fangfang Ma, Zhiqiang Fu, Zhongyu Wang & Jingwen Chen (**2017**), Adsorption of nitrobenzene on the surface of ice: A grand canonical monte carlo simulation study, *Journal of Physical Chemistry C*, 121: 15746-15755.

Hong-Bin Xie, Fangfang Ma, Yuanfang Wang, Ning He, **Qi Yu** & Jingwen Chen (**2015**). Quantum chemical study on ·cl-initiated atmospheric degradation of monoethanolamine, *Environmental Science & Technology*, 13246-55.

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