



Universiteit
Leiden
The Netherlands

Towards understanding the toxicity of copper nanoparticles in aquatic ecosystems

Song, L.

Citation

Song, L. (2015, July 2). *Towards understanding the toxicity of copper nanoparticles in aquatic ecosystems*. Retrieved from <https://hdl.handle.net/1887/33238>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/33238>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/33238> holds various files of this Leiden University dissertation

Author: Lan Song

Title: Towards understanding the toxicity of copper nanoparticles in aquatic ecosystems

Issue Date: 2015-07-02

Towards understanding the toxicity of copper nanoparticles in aquatic ecosystems

Lan Song

宋 兰

© 2015 Lan Song

Towards understanding the toxicity of copper nanoparticles in aquatic ecosystems. Ph.D. Thesis Leiden University, The Netherlands

ISBN: 978-90-9029071-3

The cover: from top left, clockwise, copper nanoparticles under Transmission Electron Microscopy; *Daphnia Magna*; Lemnaceae species; fish gill under Scanning Electron Microscopy (photos: © Lan Song).

Printed in the Netherlands

Towards understanding the toxicity of copper nanoparticles in aquatic ecosystems

Proefschrift

ter verkrijging van de graad van

Doctor aan de Universiteit Leiden,

op gezag van de Rector Magnificus Prof. mr. C.J.J.M. Stolker,

volgens besluit van het College van Promoties

te verdedigen op donderdag 2 juli 2015

klokke 13:45 uur.

door

Lan Song

Geboren te Sichuan

In 1987

Promotiecommissie:

Promotor: Prof. dr. W.J.G.M. Peijnenburg

Co-promotor: Dr. M.G. Vijver

Overige leden: Prof. dr. T. Fernandes - Heriot-Watt University (UK)

Prof. dr. A.J. Murk (Wageningen-IMARES)

Dr. D. Sijm - Bureau REACH, RIVM (Bilthoven)

Prof. dr G.R. de Snoo (Leiden Univeristeit)

Prof Peter M. van Bodegom (Leiden Universiteit)



This PhD study was funded by the Environmental Cheminformatics (ECO) Marie Curie Initial Training Network (ITN) under the 7th Framework Programme of European Union.

Table of Contents

Chapter 1	General introduction	1
Chapter 2	Smart Nanotoxicity Testing for Biodiversity Conservation <i>Environmental Science and Technology. 2011, 45: 6229-6230</i>	17
Chapter 3	Species-specific toxicity of copper nanoparticles among mammalian and piscine cell lines. <i>Nanotoxicology. 2014, 8:383-393</i>	21
Chapter 4	Assessing toxicity of copper nanoparticles across five cladoceran species. <i>Environmental Chemistry and Toxicology. 2015, doi: 10.1002/etc.3000</i>	47
Chapter 5	Comparative toxicity of copper nanoparticles across three Lemnaceae species <i>Science of the Total Environment.2015, 518-519:217-24.</i>	69
Chapter 6	A comparative analysis on the in vivo toxicity of copper nanoparticles in three species of freshwater fish. <i>Chemosphere. Under revision</i>	89
Chapter 7	General discussion	111
Summary		127
Samenvatting		131
Acknowledgements		135
Curriculum Vitae		137

