Fate, accumulation and impact of metallic nanomaterials in the terrestrial environment

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Proposition

Accompanying the thesis

"*Fate, accumulation and impact of metallic nanomaterials in the terrestrial environment*"

By Juan Wu

1. The impact of metallic nanoparticles on plants is affected by the exposure pathway, the shape and the size of nanoparticles. (Chapters 2 and 3)

2. The particulate-specific toxicity and bioavailability of metallic nanoparticles should not be underestimated in ecotoxicological assessment of nanoparticles. (Chapters 2 and 3)

3. Incorporating the dynamics of the fate determining processes of metallic nanoparticles can gain a more accurate and realistic assessment of nanotoxicity. (This thesis)

4. Trophic transfer of metallic nanoparticles along a food chain can induce toxicological consequences on consumers. (Chapter 5)

5. Considering long-term impacts of metallic nanoparticles in soils is important for a more complete and accurate environmental risk assessment of nanoparticles. (This thesis)

6. We must come to terms with the widespread uncertainty present in risk assessment of nanoparticles and acknowledge that it is likely to persist (Rune, Hjorth, 2017), but a better and comprehensive understanding of the interactions between nanoparticles and biological organisms may contribute to diminish the uncertainties to some extent.

7. Reporting the detailed characterization of the nanomaterials is essential in all areas of nanotoxicology to increase the reproductivity and meaningful comparison between studies (Editorial, Nature nanotechnology, 2011), which can promote the effective risk assessment of nanomaterials.

8. Agriculture is a complex socioecological system (Lombi et al. 2019), the assessment of the potential risk of agricultural application of nanomaterials requires attention not only to the targeted sectors such as plants but also to the indirect related sectors such as soil microbes, animals and the farmers.

9. A deep cross-disciplinary cooperation is necessary for designing environmentally safe and sustainable nano-agrochemicals to reduce the potential threats of nanoparticles to food safety. (Inspired by Lowry et al. 2019)

10. Opportunities and challenges coexist, keeping balance between the negative side and the positive side is the key for the application of new technologies such as nanotechnology; this is similar for life in general.

11. Designing experiments and interpreting results are more fun than performing experimental work.