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Authors: Xiulei Fan, Chao Wang, Peifang Wang, Bin Hu, Xun Wang

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TiO_2 nanoparticles in sediments: Effect on the bioavailability of heavy metals in the freshwater bivalve *Corbicula fluminea*

Xiulei Fan[a,b], Chao Wang[a,b], PeifangWang[a,b,*], Bin Hu[a,b], Xun Wang[a,b]

[a]Key Laboratory of Integrated Regulation and Resources Development on Shallow Lakes, Ministry of Education, Hohai University, Nanjing, People's Republic of China, 210098

[b]College of Environment, Hohai University, Nanjing, People's Republic of China, 210098

[*]Corresponding author; E-mail: pfwang2005@hhu.edu.cn

Highlights

- Heavy metals can be adsorbed on TiO_2 NP surface in sediment.
- TiO_2 NPs in sediments changed the speciation distribution of heavy metals.
- TiO_2 NPs enhanced the bioavailability of EXC, CAR, and IMO
- TiO_2 NPs increased metals accumulation in *C. fluminea* by Trojan horse effect

Abstract

Most studies investigating the influence of TiO_2 NPs on heavy metal bioavailability have focused on the aqueous phase; however, few have examined the sediments containing more nanoparticles. Here, we investigated the effects of TiO_2 NPs on heavy metal bioavailability in *C. fluminea* in sediments. The interactions between the TiO_2 NPs and metals in sediments, the influence of TiO_2 NPs on metals levels in aqueous phase and geochemical speciation were also explored. The results indicated the large adsorption capacity of TiO_2 NPs and the strong adsorption affinity to metals caused the metals adsorbed on nanoparticles, which decreased the metals concentrations in water phase. Changes in metal speciation caused by metals in EXC, CAR, and IMO partly transported from sediments to TiO_2 NPs during the aging of sediments. Heavy metals contents in *C. fluminea* tissues were in the order of gill > visceral mass > mantle > foot and increased with the increasing TiO_2 NPs contents in